Exhibit 19

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

IN RE: NATIONAL FOOTBALL LEAGUE PLAYERS' CONCUSSION INJURY LITIGATION	No. 2:12-md-02323-AB MDL No. 2323
Kevin Turner and Shawn Wooden, *on behalf of themselves and others similarly situated,* Plaintiffs, v. National Football League and NFL Properties, LLC, successor-in-interest to NFL Properties, Inc., Defendants.	Hon. Anita B. Brody Civil Action No. 2:14-cv-00029-AB
THIS DOCUMENT RELATES TO: ALL ACTIONS	

DECLARATION OF THOMAS VASQUEZ Ph.D.

1. I have personal knowledge concerning the matters addressed herein, and submit this declaration in connection with Plaintiffs' motion for approval of the proposed settlement of claims in this litigation. If called as a witness, I could and would testify competently to the facts and opinions set forth in this declaration. I hold all of the opinion set forth herein to a reasonable degree of scientific certainty.

2. I am Vice President of Analysis Research Planning Corporation ("ARPC"), headquartered in Washington, D.C. I have over 35 years of experience in management consulting for private sector clients, and the development of economic models for US and foreign governments to analyze and develop tax, expenditure and regulatory policy. I have

provided expert testimony and analytical support for a broad spectrum of issues and industries. I have consulted on numerous cases including cases for National Gypsum, Fireboard Corporation, Reynolds Tobacco, CSX Inc., Owens Corning, Tyson Foods, Halliburton, AstraZeneca, Foster Wheeler, Gulf Coast Claims Facility, GM Ignition Switch Compensation Fund, and Oracle.

3. Before joining ARPC, I was CEO of Yankelovich Partners, and the Partner in charge of KPMG's Corporate Transactions practice, which includes the bankruptcy practice, the valuation practice, the investment banking and litigation support practice and the expert testimony practice. I was the founder and President of the Policy Economics Group, a firm that was subsequently sold to KPMG. I was responsible for all data base development and tax simulation modeling for federal and state government clients in the United States as well as foreign governments including, among others, Egypt, Pakistan, Hungary, the former Soviet Union, Trinidad-Tobago, Virgin Islands, Guam, El Salvador, and Guatemala. Earlier in my career, I was the Deputy Director of the Office of Tax Analysis at the U.S. Department of Treasury, where I designed and built economic models used to analyze U.S. Government policies. A copy of my CV is attached to this declaration as Exhibit A.

4. In mid-2013, I was asked by Co-Lead Class Counsel in the federal multidistrict litigation[1] to undertake an analysis to assist in settlement negotiations. The analysis was designed to assist in developing a monetary award grid that could be used in negotiating claims and modeling the total cost of resolving all pending and future claims by former National Football League (NFL) players alleging brain injury caused by concussive and sub-concussive impacts (concussion-related injuries). I was also asked to determine whether the agreed upon settlement amount and timing of payments was sufficient to meet all the obligations arising from

[1] *In re: National Football League Players' Concussion Injury Litigation*, (MDL No. 2323) (E.D. Pa.).

these claims. My conclusions concerning the sufficiency of the Monetary Award Fund of $675 million were included in my February 2014 report.[2]

5. As a result of issues raised by certain objecting parties, I have now been asked to elaborate on certain elements of the work I conducted for my initial report. Specifically, I have been asked to discuss: (1) the procedures applied in the development of the Monetary Award Grid, including the effect of age and years played on award amounts, and (2) the sufficiency of funding for the Baseline Assessment Program (BAP).

Development of the Monetary Award Matrix

6. The development of settlement award matrices is generally affected by three components: (i) incorporating the effect of additional factors (not related to concussion in the NFL) that likely contribute to the impairment of the individual; (ii) incorporating the general influence of the known characteristics of the U.S. tort system, and (iii) negotiation between plaintiffs and defendants.

7. The following addresses the issues involving the first two components. The diseases compensated in the program are not solely found in former football players. Indeed, they are experienced by all types of individuals. The incidence of these diseases is found across gender, all races, all occupations, and likely within any cohort one may define.

8. This fact clearly demonstrates that there is not a sole, direct causal link between playing football, experiencing concussions, and contracting some level of neurological impairment or condition/disease. Indeed, we should expect that if there were no causal link between concussions and these diseases, many of the former players would nonetheless contract one of

[2] *See* "NFL Concussion Liability Forecast", February 14, 2014 (attached to this declaration as Exhibit B).

these diseases in their lifetime (in this hypothetical the incidence rate would be that of the general population).

9. Of course, the exact contribution of all the factors (concussions and the other factors) cannot be known. Epidemiologists may attempt to statistically determine the relative contribution of one or a few of the factors by viewing large groups of individuals. The analysis may indicate the average relative effect of various factors on the entire group, but cannot conclude anything about a single individual.

10. Two factors are of particular concern in the development of the award matrix. The first is that the compensable disease types are strongly related to age (less so with ALS); as an individual ages, his probability of contracting one of the compensable diseases increases dramatically regardless of whether or not he played football. The second is the number and severity of concussions that a player experienced (due to the reported connection between TBI and the onset of neurological impairment/disease).

11. The relative values highlight the effect of age. As former players age, the relative contribution of concussions experienced as a player declines in importance – an unfortunate consequence of aging is the higher probability of the onset of serious neurological impairment issues. The Monetary Award Matrix recognizes the reduced contribution of concussions and lowers the award amount as the player ages.

12. Table 1 shows the relative impact of age on the onset of Level II (Dementia). In the general population, it is estimated that a 75 year old is 302 times more likely to experience dementia than a 45 year old. All else equal, dementia experienced by a 75 year old is less likely to have been caused by concussions. A major factor is simply the process of aging.

Table 1

Relative Values: Annual Incidence of Disease, by Age

Age	Level II (Dementia)
45	1
55	13
65	82
75	302

Note: Individual years are interpolations from broad age groups
Level II is based on the incidence rates for dementia

13. It is reported in the scientific literature that the frequency and severity of TBI are factors in the causal link between TBI and the onset of neurological impairment/disease - the higher the number and severity of TBI, the greater the risk of neurological impairment. However, accurate and complete information on the number and severity of the concussions experienced by former players is lacking. Therefore, the number of years played by a former player is used as a proxy for the exposure to concussions and TBI. It is assumed that the longer an individual played, the greater the number and severity of impacts he experienced and the greater should be his monetary award. Years played in the NFL also recognizes the significance of pre-NFL concussion risk (*e.g.*, youth football, high school football, college football) which may have contributed greater relative exposure in players playing few years in the NFL.

14. The Monetary Award Matrix incorporates this effect into its values. A player with at least five years of playing time receives full award values for any disease. For players with less than five years of playing time the award values are reduced proportionately as playing time decreases.

Incorporating the Effect of the U.S. Tort System

15. It has long been recognized that the age of a claimant affects the value of his claim in the tort system; all else equal, the older the individual, the lower the award. While a precise quantification of this effect is not possible, a few of the reasons generally accepted as the cause of the age effect include: (1) lower lost earnings (since the older individual has a shorter remaining work life), (2) lower costs for long term medical care (since the older individual has a shorter life expectancy), and (3) fewer dependents.

16. Experience indicates because of these factors, the award may be reduced by 2% to 3% for every year over age 45. This effect is also incorporated in the matrix. These considerations were incorporated into a working model of the matrix to be used in connection with negotiating the settlement.

Sufficiency of Funding for the Baseline Assessment Program (BAP)

17. In connection with my original work on the Settlement, I analyzed the sufficiency of funding for the BAP.[3] The following summarizes my analysis and conclusions concerning the BAP funding. The BAP provides for:

- testing of former NFL players to establish baseline levels of neurocognitive functioning and,
- paying supplemental financial benefits (BAP supplemental benefits) for players who are diagnosed under the BAP with Level 1 neurocognitive impairment.

[3] The Class Action Settlement Agreement as of June 25, 2014 ensures that the $75 million funding for the BAP is sufficient. Section 5.14 (b) states: "the maximum per player BAP Supplemental Benefit payable under this Section, taking into account such factors as the number of Retired NFL Football Players using the BAP and diagnosed with Level 1 Neurocognitive Impairment, shall be determined on the one-year anniversary of the commencement of the BAP by Co-Lead Class Counsel and Counsel for the NFL Parties, in consultation with the BAP Administrator, and with the approval of the Court. The maximum per player benefit will be set at a sufficient level to ensure that there will be sufficient funds, without exceeding the Seventy-Five Million United States Dollars (U.S. $75,000,000) cap on the BAP Fund, to pay for every Retired NFL Football Player to receive one baseline assessment examination."

18. The settlement agreement provides $75 million for the BAP fund to cover both the baseline testing and supplemental benefits. Testing under the BAP will proceed for 10 years after its implementation; Supplemental Benefits may be payable for an additional 5 years after expiration of the testing period.

19. There are three main components that determine the total cost of the BAP program. The first is the cost of the BAP program for Baseline Examinations, which is dependent on the number of players who will participate in the baseline examination program, and the average cost per examination.

20. The second is the cost of Supplemental Benefits provided to retired players under the BAP program, which is dependent on the number of players that will qualify for supplemental benefits, and the average supplemental benefit.

21. The third is the cost to administer the BAP program.

22. The remainder of this document describes my conclusions regarding the total cost of the Program, as well as a description of the methodology used to form my conclusions. Certain components of the analysis are dependent on cost estimates provided by the BAP Administrator.[4]

Costs of Baseline Examinations

23. The key issue in determining the adequacy of the fund is the estimate of the number of players who will participate in the BAP program for baseline examinations. Retired players that have registered for the Settlement are eligible to participate in the baseline examination component of the Program. The analysis conducted for my February 2014 Report reflected that as many as 11,886 former players who were still alive at the end of 2013 would register for the

[4] Garretson Resolution Group.

Settlement. Of these, 96 have already received a Qualifying Diagnosis leaving 11,790 players who are assumed to participate in the BAP.[5]

24. The average cost of a baseline exam is estimated by the BAP Administrator to be $3,500 per exam. This results in a total nominal cost of approximately $41.3 million ($3,500 times 11,790 participating players).

Funding Available for Supplemental Benefits

25. The cost of supplemental benefits depends on the estimate of the number of players with Level 1 neurocognitive impairments and the average cost per eligible player. As indicated above, the Settlement Agreement ensures that funding is adequate by providing that supplemental benefits will be set to precisely exhaust the $75 million of funding.

26. Table 2 shows the amount of funds available for Supplemental Benefits. Administrative costs and baseline examinations are anticipated to cost approximately $48.8 million. That leaves $26.2 million available to pay supplemental benefits.

[5] All living retired players yet to manifest a disease and be diagnosed who register are assumed to participate in the BAP. As indicated in my February 2014 Report, there are 11,790 players that are still alive, but as yet undiagnosed, including both those who have already filed lawsuits and additional players whom it is assumed will register for the Settlement in the future.

Table 2

Estimated Cost of BAP Program - Baseline Examination, BAP Supplemental Benefits and Cost of Administration

($ Millions)

Category	Amount
Total Fund Value	$75.0
Use of Funds	
Administration Costs[1]	$7.5
Cost of Baseline Examinations[2]	$41.3
Amount Available for Supplemental Benefits	$26.2
Total Use of Funds	$75.0

1.) Source of administrative costs: BAP Administrator
2.) 11,790 former players at an average cost of $3,500 per exam
Source of $3,500 average cost: BAP Administrator

27. Based on information provided by the 4,200 former players that have already filed claims, as well as background and induced incidence rates for Level 1 neurocognitive impairments, I estimate that between 500 and 750 former players will be diagnosed with Level 1 Neurocognitive Impairment and thus qualify for Supplemental Benefits.

28. Table 3 shows the average amount per player of Supplemental Benefits that could be paid under three alternative eligibility assumptions. The alternative assumptions allow for average per player Supplemental Benefits from a low of $35,000 to a high of $52,000.

Table 3

Average Supplemental Benefits Under Alternative Eligibility Assumptions

Alternative	Number of Players Receiving Supplemental Benefits	Average Benefit	Total Cost ($ millions)
Low	500	$52,000	$26.2
Middle	625	$42,000	$26.2
High	750	$35,000	$26.2

I declare under the penalty of perjury that the foregoing is true and correct.

Dated: November 12, 2014

Washington, D.C.

Thomas Vasquez, Ph.D.

Exhibit A

CV of Thomas Vasquez Ph.D.

Dr. Vasquez is a vice president at Analysis, Research & Planning Corporation (ARPC) in the New York office. Dr. Vasquez has over 35 years of experience in management consulting for private sector clients, the development of economic models for US and foreign governments to analyze and develop tax, expenditure and regulatory policy and providing expert testimony over a wide range of issues.

Dr. Vasquez has provided management consulting services for private sector companies in a wide array of industry sectors. The services include identifying methods to: (1) increase the stock price or value of the company; (2) leverage the firm's brand asset; (3) assist underperforming companies and (4) provide general valuation services.

Dr. Vasquez has assisted US and foreign governments in the development of tax, expenditure and regulatory policy. The services include the development of large scale micro-economic models to allow policymakers to determine individual and company behavioral reactions to tax and regulatory policy.

Dr. Vasquez has provided expert testimony, depositions and analytical litigation support on a broad spectrum of issues involving statistical techniques, computer simulation, economic behavior and economic models, including, among others:

- Using statistical models to forecast a company's future liability from lawsuits related to its former production of asbestos including the following representative assignments – National Gypsum Corporation, the Fibreboard Corporation, Owens Corning, Congoleum, Western MacArthur, Burns and Roe, Inc. and Specialty Products Holding Corp.,
- Using statistical models to forecast a company's future liability from lawsuits related to its former sales of products.
- Using statistical models to determine the settlement value of bodily injury and financial loss claims resulting from exposure to a wide range of hazardous or defective materials or activities.
- The statistical analysis of the determinants of supply and demand in certain industry segments for use in business valuations before the Bankruptcy Court.
- The impact of regulation and tax policy on prices, sales and production.
- Analyzing the allocation of liability from a state's superfund tax.
- The statistical analysis of reasonable officer compensation levels in closely held companies.

Prior to joining ARPC, Dr. Vasquez was president and CEO of Yankelovich Partners, Inc., a leading market research firm. While at Yankelovich Partners, Dr. Vasquez had responsibility for engagements designed to determine the best approach to maximize the value of the client's firm. These engagements involved understanding the source of the value components of the firm – value of the firm's brand, product/service lines responsible for increasing (decreasing) stock price, the role of joint products and other key components of the firm's value.

From 1993 to 1997, Dr. Vasquez was the National Partner in Charge of Corporate Transactions Services for KPMG Peat Marwick. In this role he practiced in and led four of KPMG's national

practices. One practice area was in the area of litigation support. This area involved almost exclusively the use of highly trained professionals in providing expert testimony in a wide range of litigation issues. The second practice area involved providing consulting services in the bankruptcy and troubled company area. This area involved analyzing the condition and prospects of a company in financial distress, generally involving recommendations for expense control, revenue growth, elimination/sale of product and distribution lines and the elimination/selling of production sites. The third area is investment banking. This area focused on three major components: (1) buying and/or selling of companies for middle market clients; (2) advise to non-public clients preparing an Initial Public Offering, and (3) advise to clients on methods to increase share price and/or cash flow in anticipation of sale. The fourth area was business valuation. This area focused on the valuation of businesses in a wide range of settings including bankruptcy, fairness opinions, mergers and acquisitions, estate planning and other venues requiring valuation services.

Dr. Vasquez served on the Firm's Board of Directors from 1993 to 1997 and served as the Chairman of the Board's Strategic Planning Committee.

Prior to selling his firm to KPMG, Dr. Vasquez was the founder and President of the Policy Economics Group. Dr. Vasquez was responsible for all data base development and tax simulation modeling for federal and state government clients in the United States as well as foreign governments including among others Egypt, Pakistan, Hungary, the former Soviet Union, Trinidad-Tobago, Virgin Islands, Guam, El Salvador and Guatemala. Dr. Vasquez also developed similar models using specialized industry data bases to determine tax impacts and behavioral responses for commercial firms, industry associations and law firms. These models were also used to formulate the client's strategic direction, market initiatives and value maximization strategies.

Prior to establishing the Policy Economics Group, Dr. Vasquez was the Deputy Director for the U.S. Department of the Treasury Office of Tax Analysis. While there, he guided U.S. tax policy analysis and designed large micro-simulation models and data bases for the U.S. Treasury Department and the Joint Tax Committee of the U.S. Congress. He appeared before Congress to provide testimony on such issues as capital gains taxation. He also designed numerous specialized models and data bases for analyzing policy issues at the company, industry, and individual levels.

Professional Experience:

President and CEO, Yankelovich Partners Inc., 1997 to 1999
National Partner in Charge, Corporate Transactions Services, KPMG Peat Marwick, 1993 to 1997.
Managing Partner, Policy Economics Group, KPMG Peat Marwick, 1987 to 1993.
Founder and President, Policy Economics Group, 1983 to 1987.
Deputy Director, Office of Tax Analysis, U.S. Department of the Treasury, 1979 to 1983.
Assistant Director, 1978 to 1979; Fiscal Economist, 1972 to 1976.
Chief Economist, New York State Economic Development Board, 1977 to 1978.
Staff Economist, Congressional Joint Committee on Taxation, 1976.

Staff Economist, American Enterprise Institute for Public Policy Research, 1972.

Education:
Ph.D., Economics, Clark University, 1973.
M.A., Economics, Clark University, 1972.
B.S., Mathematics, State University of New York - Potsdam, 1970.

Legal Experience and Testimony:

National Gypsum Company Bankruptcy Proceedings, 1991
Deposition
Testimony
Gerald Ahern, et. al. vs. Fiberboard Corporation, et. al., 1994
Deposition
Testimony
Ezell Thomas, et. al. vs. R.J. Reynolds Tobacco Company, et. al., 1999
Deposition
Fiberboard Corporation and Owens Corning vs. R.J.Reynolds Tobacco Company, et. al., 1999
Deposition
Western Mac Arthur Company and Mac Arthur Company vs. General Accident Insurance Co. of America; United States Fidelity & Guaranty Co.; Argonaut Insurance Company, 1999
Affidavit
CSX Transportation, Inc. and American Home Ins. Co., 2000
Deposition
ADR Proceeding Celotex vs. Travelers Casualty and Surety Co. and London Market Insurers, 2000
Deposition, 2004
Testimony, 2004
Owens Corning Bankruptcy Proceedings, 2001
Deposition, 2004
Trial Testimony, 2005
Michael Albanese vs. Compaq Computer Corporation, 2002
Affidavit
ADR Proceeding ACandS, Inc. vs. Travelers Casualty and Surety Co., 2003
ASARCO vs
Deposition, 2003
Western Mac Arthur Company and Mac Arthur Company Bankruptcy Proceedings, 2003
Oglebay Norton Bankruptcy Proceedings, 2004
Deposition, 2004
Trial Testimony, 2004
Halliburton Bankruptcy Proceedings, 2004
Congoleum vs Ace Ins. Et al, 2005
Deposition, 2005
Trial Testimony, 2006
Gene B. Griego, et al., Plaintiffs, vs. Bechtel National, Inc. et al., Defendants
Deposition, 2005

Sandra Sue Fullen, et al, Plaintiffs v. Philips Electronics North America Corporation, a Delaware corporation, et al., Defendants
Deposition, 2005
St. Paul Fire and Marine Insurance Company, Plaintiff, vs. A.P.I., Inc., Defendant and Counter-Claimant
Deposition, 2005
Dana Corporation Bankruptcy Proceedings, Case No. 06-10354(BLR), 2007
Deposition, 2007
Trial Testimony, 2007
API, INC. Asbestos Settlement Trust v. Atlantic Mutual Insurance Company; Civil No. 09-0665 (JRT/JJG); United States District Court, D. Minnesota; July 9, 2010.
Deposition, 2010
Applebee's International, Inc., DineEquity, Inc. and Weight Watchers International, Inc. Sheree Shepard and Anthony Watts, On Behalf of Themselves and All Others Similarly Situated vs. DineEquity, Inc. et al.; United States District Court; District of Kansas; No. 08-cv-2416.
Deposition, 2010
API, Inc. Asbestos Settlement trust, et al. v. Zurich American Insurance Company, et al. Court File No. 09-CV-975 (JRT/JJG)
Deposition, March 29, 2011
Tronox Incorporated, Tronox Worldwide, LLC f/k/a; Kerr-McGee Chemical Worldwide LLC, and Tronox, LLC, f/k/a Kerr-McGee Chemical LLC vs. Anadarko Petroleum Corporation and Kerr-McGee Corporation
Deposition 2012
Specialty Products Holding Corp., et al Bankruptcy proceedings, Case No. 10-11780(JFK), 2012
Deposition, 2012
Trial Testimony, 2013
Fundamental Long Term Care, Inc., Debtor; The Estate of Juanita Amelia Jackson, et al, v. General Electric Capital Corporation, et al; Case No.: 8:11-bk-22258-MGW Chapter 7; United States Bankruptcy Court, Middle District of Florida, Tampa Division.
Deposition, 2014
Trial Testimony, 2014

Exhibit B

NFL Concussion Liability Forecast

Prepared by:
Thomas Vasquez Ph.D.
Analysis Research Planning Corporation
February 10, 2014

Table of Contents

1. Introduction

On January 31, 2012, a federal multidistrict litigation was established in the United States District Court for the Eastern District of Pennsylvania, In re: National Football League Players' Concussion Injury Litigation, (MDL No. 2323). Additional similar lawsuits were also filed and are pending in various state and federal courts.

I was asked by representatives of the Plaintiff's Executive Committee in that litigation to undertake an analysis to assist in the settlement negotiations. My analysis is designed to determine the total cost of resolving all pending and future claims by former National Football League (NFL) players alleging brain injury caused by concussive and sub-concussive impacts (concussion-related injuries). I was also asked to determine whether the agreed upon settlement amount and timing of payments is sufficient to meet all the obligations arising from these claims.

This report presents the methodology and conclusions from my analysis.

2. Summary of Conclusions

As of the beginning of the 2013/2014 NFL season there were approximately 21,000 individuals who are former NFL players – approximately 19,400 who are still alive and 1,700 who are deceased.[1] Pursuant to the terms of the Settlement Agreement, upon approval of the settlement, all of these individuals will be eligible for payment following registration and submission of appropriate evidence of a qualifying diagnosis of a concussion-related injury and related claims information.

My primary conclusions are:

1.) Approximately 3,600 of the former players are estimated to develop compensable injuries and participate in the settlement with total compensation of approximately $950 million. Because many of the injuries take years to develop, the compensation stream extends far into the future. Indeed, only approximately 54% of total compensation will be paid in the first 20 years of the operation of the settlement fund.

2.) The agreed upon level of funding (taking into account the earnings on the funds, the payout stream and the compensation scheme) is sufficient to pay all of the anticipated

[1] An estimated 3,300 former players have died since 1984. The Settlement Agreement, however, presumptively limits eligibility for monetary awards to the Representative Claimants of players who died on or after January 1, 2006. Approximately 800 deceased former players are eligible under this limitation. However, the analysis includes 900 players deceased from 2000 through 2005 based on a provision in the Settlement Agreement concerning statutes of limitation. The analysis of the former players who died from 2000 to 2005 is different from that concerning the former players who died after 2005, as explained herein.

concussion-related claims. I understand that the funding for the Monetary Award Fund (MAF) totals $675 million[2] to be paid over the next 20 years.

My conclusions are based on: (1) a compilation of the number of former players (both still alive and deceased) that are eligible to be class members which includes detailed information on their demographics, current compensable injury (if any) and NFL playing experience; (2) an in depth review of the medical literature and health statistics related to concussion-related injuries; (3) the application of a life cycle forecasting model that follows each individual player over time (applying epidemiological probabilities each year of the player's remaining life, the model determines whether and if so, when a player contracts a compensable injury), and; (4) estimates of the probability that the former players elect to participate in the settlement.

Certain estimates and assumptions are critical in forming my opinion. The following is a summary of the analysis supporting my two basic conclusions.

Total Compensable Claims and Compensation

Table 2-1 provides a summary of estimated compensable claims and total compensation by type of injury based on the compensable injuries defined in the Settlement Agreement. Approximately 3,600 former players will receive payment. The overwhelming majority, approximately 15,000, are not compensated because they never contract a compensable disease. The remaining 2,300 do contract a compensable disease but based on evidence from other mass tort settlements, it is estimated that these eligible class members never elect to participate.

[2] The total settlement is $750 million. However, $75 million is earmarked for the Baseline Assessment Program (BAP), leaving $675 million to pay compensation to class members.

Table 2-1
Former Players with Compensable Concussion-Related Injury
by Type of Injury with Total Compensation
($ millions)

Most Serious Injury/ Disease	Total Claims		Total Compensation	
	Count	Percent	Amount	Percent
Compensable Injury/Disease				
ALS	18	0.5%	$49.4	5.3%
Death w/CTE	46	1.3%	$64.9	7.0%
Parkinson's	14	0.4%	$3.2	0.3%
Alzheimer's	1,757	48.9%	$474.9	50.9%
Level 2	1,761	49.0%	$341.0	36.5%
Level 1.5	na	na	na	na
Total, Compensable	3,596	100.0%	$933.4	100.0%
Not Compensated	17,474	na	na	na
Grand Total	21,070	na	$933.4	100.0%

Note: All compensation categorized by most serious injury. All Level 1.5 claims are assumed to progress to Level 2 and more serious levels. $248 million is paid to former players at Level 1.5. This amount is included in the category of their most serious disease as follows: $212 milion paid at Level 2; $34 million to Alzheimer's and $2 million to other disease types. Players are not compensated because they did not experience a compensable injury or did not file a claim.

The overwhelming percent of compensable claims and compensation is paid to former players with Alzheimer's disease or Level 2 neurocognitive disorders – 98% of compensable claims and 87% of compensation. The distribution of claims reflects the relative probabilities of the occurrence of the various diseases in the general population combined with the additional incidence related to concussions.

Timing of Compensation Payments and Funding

Table 2-2 shows the timing of payments to former players and the receipt of funding by the settlement fund through the payment of the last compensable claim. The timing and total amount of funding are sufficient to pay all claims.

- Compensation payments in the first five years are high because there are a relatively large number of former NFL players who have already indicated they intend to file a claim. These claimants include former players who have already been diagnosed with a

compensable injury and will be paid in the first few years of the settlement fund. After these claims are resolved, the fund will be receiving and paying claims at a significantly lower rate, as the filing of future claims depends on the timing of the manifestation of future compensable injuries;

- The initial funding amount of approximately $364 million (55% of the total funding) is designed to provide enough assets to pay the compensable claims already identified and to cover the startup costs of the claim processing facility while still leaving a significant asset. The remaining assets are supplemented with an additional $311 million which is paid in annual installments through 2033. At that time, the remaining assets of the settlement fund (with earnings) are sufficient to pay all remaining claims.
- The Fund Balance increases through 2034 as the additional funding and earnings exceed the required amount to pay claims. The fund balance begins to decline after that as the settlement fund continues to pay claims, but with earnings as its only source of revenue - there is no additional funding contributed after 2033. The last claim is paid in the early 2080s at which time the fund is estimated to have a balance of approximately $80 million.[3]

Table 2-2
Settlement Fund Compensation Payments, Funding and Earnings
Through the Payment of the Last Compensable Claim
($ millions)

Time Period	Compensation Amount[1]	Funding	Earnings	End of Period Fund Balance
2014 through 2018	$292.3	$364.0	$25.0	$91.6
2019 through 2023	$78.2	$103.7	$28.1	$143.8
2024 through 2028	$95.5	$103.7	$38.6	$189.0
2029 through 2038	$178.6	$103.7	$103.2	$214.0
2039 through 2048	$167.7	$0.0	$72.9	$116.2
Remaining 35 Years	$133.3	$0.0	$103.4	$80.4
Total	$945.5	$675.0	$371.2	na

[1]Includes processing Costs

Note: Funding plus earnings is actually slightly in excess of the amount needed to pay all claims.

[3] The $80 million balance in the early 2080s implies overfunding of only approximately $5 million at 2014 levels.

The Effect of Age, Years Played in the NFL and Inflation on Settlement Amounts

The Settlement Agreement provides maximum monetary awards to players who are less than 45 years old when they are diagnosed with a compensable disease and have played in the NFL for 5 years or more. There is a reduction in the compensation levels based on age and years played beginning with players age 45 or older and players with less than 5 years of experience in the NFL. The Settlement Agreement also provides for an escalation in the compensation amounts to adjust for inflation. These adjustments have a significant effect on the average amount of compensation paid to the former players and a corresponding significant effect on the total compensation paid by the fund.

The magnitude of the effect of age, playing time and inflation depends heavily on the average age of the players when contracting a compensable disease, the number of years the individual played in the NFL and the year the disease is contracted. Table 2-3 summarizes these variables.

The table shows that the average age for former players today is approximately 51 years of age and the average age at the time of diagnosis with the most serious disease is approximately 77 years of age for both groups. Of course, 77 years of age is simply an average. It is expected that many former players will develop compensable injuries at a much younger age. Due to the average age at the time of onset of the disease, compensation amounts are subject to significant reductions from the maximum awards.

Table 2-3 also shows that 60% of all players estimated to receive compensation have fewer than the 5 years needed to receive the maximum monetary award. It also shows that individuals who have already filed a claim have significantly more playing time than individuals who have not yet filed.[4]

- First, only 35% of the players who have already filed played fewer than 5 years. However, 73% of the players who have not yet filed played fewer than 5 years.
- In addition, those who have already filed played an average of 6.3 years. Those who have not yet filed played an average of only 3.5 years.

[4] Throughout the report, a player is labeled a filer if he is currently represented by an attorney and has provided an indication the he will participate in the class. It does not necessarily mean the player has filed a law suit.

Table 2-3
Selected Characteristics of Former Players:
Age, Years Played and Year of Contracting Disease/Injury

	Age At:		Years Played		
Player Category	2014 or at Death	Year of Most Serious Injury	Percent of Players with Less Than 5 Years Played	Average Years Played	Year of Most Serious Injury
Already Filed	52.0	76.3	35%	6.3	2037
Future Filer	51.2	77.7	73%	3.5	2039
All Filers	51.4	77.4	60%	4.4	2039

Table 2-4 shows the effect of these adjustments for age and years played. Without any adjustments, players would be compensated at the maximum value for their injury – shown in the table as the Maximum Monetary Award.

Table 2-4
Effect of Age, Years Played and Inflation on Average and Total Compensation by Injury Category

		Value After Age Adjustment		Value After Age and Years Played Adjustment		Actual Final Value	
Most Serious Injury/ Disease	Maximum Monetary Award	Average Payment	Total Compensation ($ millions)	Average Payment	Total Compensation ($ millions)	Average Payment	Total Compensation ($ millions)
Compensable Injury/Disease							
ALS	$5,000,000	$2,930,000	$52.8	$2,120,000	$38.1	$2,740,000	$49.4
Death w/CTE	$4,000,000	$1,910,000	$85.8	$1,440,000	$64.9	$1,440,000	$64.9
Parkinson's	$3,500,000	$320,000	$4.5	$190,000	$2.7	$230,000	$3.2
Alzheimer's	$3,500,000	$340,000	$593.8	$190,000	$340.7	$270,000	$474.9
Level 2	$3,000,000	$210,000	$368.8	$140,000	$246.5	$190,000	$341.0
Level 1.5	$1,500,000	na	na	na	na	na	na
Total, Compensable	na	na	$1,105.7	na	$693.0	na	$933.4

Note: All Level 1.5 are assumed to progress to Level 2. All compensation categorized by most serious injury

Adjusting for age at diagnosis reduces the average compensation significantly below the maximum monetary award levels. The impact varies across injury types. For example, the average payment for diagnosed cases of ALS is $2.93 million rather than the maximum award amount of $5 million - a 40% reduction. The average age-adjusted payment for players being diagnosed with Alzheimer's is $0.34 million, about 90% less than the maximum award amount of $3.5 million.

Adjusting for years played has a less substantial effect on award values after the age adjustment. For example as Table 2-4 shows, for former players diagnosed with ALS the average payment after the adjustment for number of years played is $2.1 million – a 28% reduction. The average payment to players diagnosed with Alzheimer's disease is reduced from $0.34 million to $0.19 million.

Finally, adjusting for inflation increases average and total compensation. Again, as Table 2-4 shows, adjusting for inflation increases average payments by approximately 30% for ALS and 40% for Alzheimer's, 20% for Parkinson's, no change for death with CTE and approximately 40% for Level 2 neurocognitive disorders. However, the actual final average award amounts for each disease are significantly below the maximum monetary award amounts, resulting in an inflation adjusted total compensation amount of $933.4 million.

Player Participation Rates

The participation rate in the Settlement Agreement among eligible former NFL players is a significant factor in determining the number of claims that will be filed and thus also the amount of funds required to resolve the claims.

In order to establish an estimate of the participation rate, several factors were considered. First, experience with participation rates in other mass tort cases was reviewed. In general, participation rates in mass torts are dependent on the outreach and notice program, the lag from exposure/injury to the manifestation of a compensable disease/injury, and award size. For comparison, the participation rates for various large and widely publicized class action settlements and data on consumer product recall response rates were considered. The participation rates varied considerably, but centered in a range of 20% to 30%.

In this case, approximately 4,200 former players had already retained counsel and indicated a desire to participate at the time this analysis was prepared, which represents more than 20% of the potentially eligible population of approximately 21,100 former players.[5] I understand that there has been for some time and continues to be extensive outreach to former players by plaintiff lawyers and others to participate. Whether continuing further efforts are likely to attract a significant number of additional players is not certain.

Nonetheless, it is assumed that the participation rates in this settlement will achieve high levels because the settlement has very high public visibility, and contact information available through the NFL Players union and other sources that can be used in the notification process is available for a large portion of the potentially eligible population. My forecast of the number of future claims and the resulting cash requirements to fund the settlement assumes that 50% of the living

[5] Additional claims have been filed since this analysis was performed.

and deceased[6] former NFL players that have not yet filed will ultimately participate. When combined with those who have already filed, it is assumed that approximately 60% of all potentially eligible former players will participate in the settlement.

Inflation of Compensation Awards and the Earnings Rate of Settlement Assets

A key assumption in determining whether the settlement is adequately funded is the real rate of return earned on settlement assets. The calculations assume a 2.5% real rate of return – a 4.5% nominal yield and an underlying 2.0% inflation rate. The actual expected return is dependent on the real returns available for different types of assets and the portfolio mix adopted by the settlement administrators.

Long term historical experience suggests that a real rate of return of 2.5% is at the extreme lower level of expected returns. Returns on debt and equity both exceed 2.5% real rate of return over long periods of time. Indeed, even an extremely high reliance on low risk financial assets historically has yielded more than 2.5% annually. However, because of historically low bond yields in recent years, I conservatively assumed a 2.5% return.

Recent experience supports an average annual inflation rate of approximately 2.0% (especially since the Settlement Agreement caps the annual increase at 2.5%, thereby limiting the impact of any short term aberration). It should be noted that the adequacy of the settlement funds depends on the real rate of return, not the absolute level of the two components.

3. Methodology

The methodology used in this analysis is based on a life cycle forecasting model. The life cycle model looks at each individual in the population of former NFL players and "ages" them year-by-year into the future.

During the aging process, the life cycle model takes each of the former NFL players individually and first applies the epidemiological risk equations to compute the probability of contracting each one of the compensable injuries. The model then applies overall mortality rates to compute the likelihood of death due to other natural causes[7]. The mortality rates used to compute the likelihood of death due to natural causes are those for all causes for males in the same age group.

Thus, for each player and for each year, computations are made based on the probabilities of each of the following: (1) the player will die of natural causes, (2) he will be diagnosed with one of the compensable terminal diseases (Alzheimer's, ALS, Parkinson's, Death with CTE), (3) he

[6] The participation rate for former players who were deceased before 2006 was reduced to 20%. This is because the settlement requires that pre-2006 deceased players must satisfy local statute of limitation conditions related to wrongful death claims and such requirement will preclude eligibility for most of these claims.

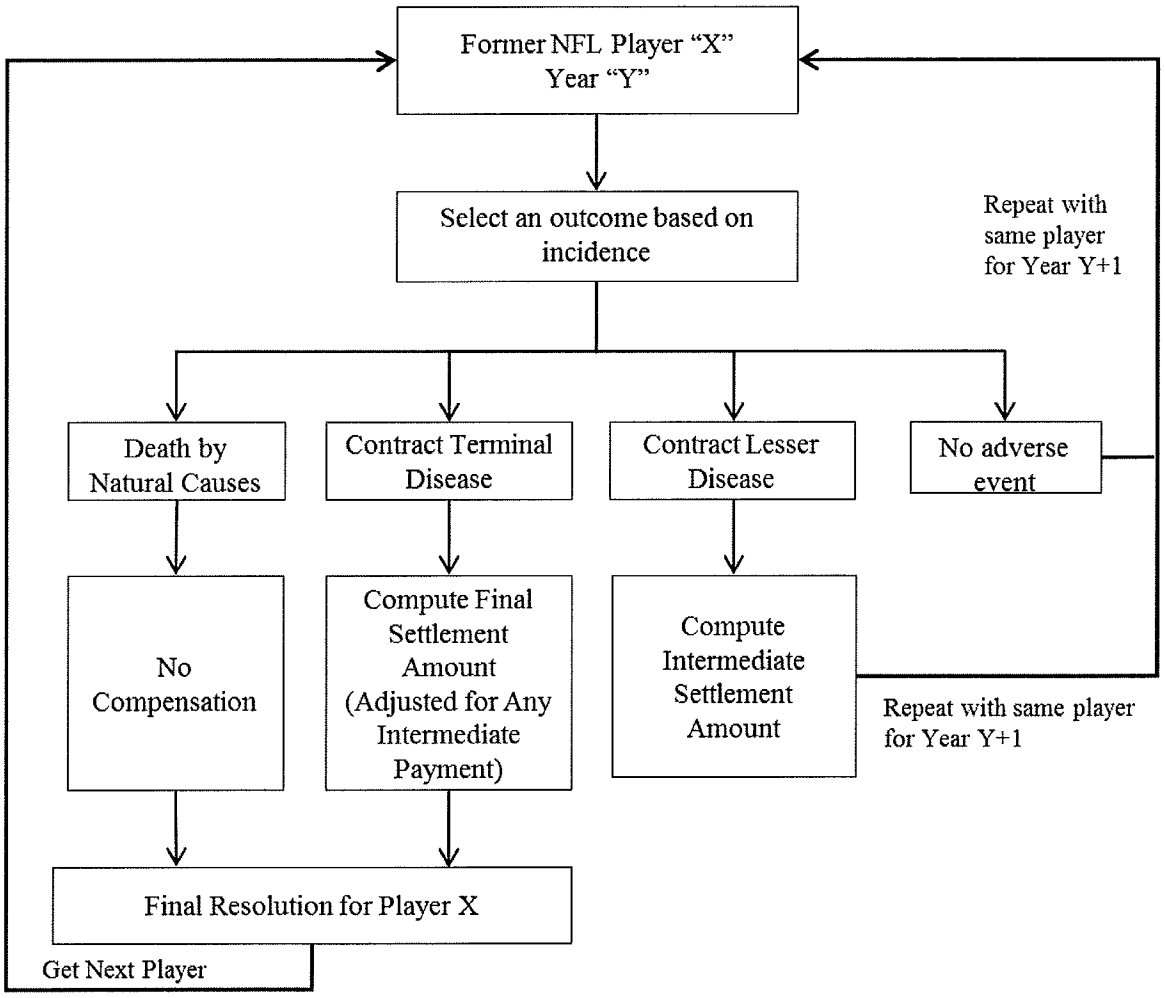
[7] The term "natural causes" used throughout this report refers to any cause of death that is not identified as a compensable disease in the Settlement Agreement.

will be diagnosed with one of the non-terminal neurocognitive disorders (Level 1.5 or 2), and (4) he will not experience any of these adverse conditions during that year.

These steps are repeated year-by-year, changing the mortality rates and disease incidence rates accordingly for age until the individual player reaches a final resolution – either he dies of natural causes or he is diagnosed with one of the terminal diseases and receives full final compensation. The model then repeats this entire process for the next player until all players in the population have reached the final resolution stage, and the last member of the population of former NFL players is no longer alive.

A diagram of the life cycle modeling methodology is shown in Table 3-1.

Table 3-1: Life Cycle Methodology Overview



As the diagram shows, there are two possibilities for reaching a final resolution with a player: (1) when the model predicts that a player dies of natural causes he is removed from the eligible population either without compensation or with compensation for a non-terminal disease, or (2) when the model predicts that a player is diagnosed with one of the terminal diseases, a computation is made of the settlement amount due to him based on the disease, his age and the number of playing years. When the model predicts that a player is diagnosed with a neurocognitive disorder, he is assigned a Level 2 diagnosis. In every case where Level 2 is diagnosed, it is assumed that the player initially presented with a Level 1.5 disorder three years earlier. A computation is made of the settlement amount due to him based on condition, age and playing years as he progresses from Level 1.5 to Level 2, and that player is run through the model again repeatedly until his date and cause of death or terminal disease are determined with compensation calculated accordingly over time.

Once a player has been determined by the model to be diagnosed with a disease that is eligible for compensation, the computation of the settlement amount is made based on the compensation matrix. This matrix identifies a maximum value of compensation for each disease diagnosis, and then makes adjustments for certain factors that take into account background incidence and risk exposure such as the player's age at the time of the diagnosis and the number of years he played in the NFL.

There are 1,712 deceased former NFL players who may be eligible for compensation. This includes 76 players who have filed claims that include a qualifying diagnosis, and 1,636 non-filers who died between 2000 and 2013. In this analysis, for claims already filed that provided a qualifying diagnosis, this information was used to determine the amount of compensation due.

Deceased players for which no claim was filed but whose survivors are potentially eligible for compensation and deceased players who filed a claim but included no diagnosis information were also run through the life cycle forecasting model retrospectively in order to determine the likely date of diagnosis if any for a compensable disease. In order to forecast compensation that may be paid to these deceased players, the analysis does the following: (1) retains those cases in which death occurred between 2000 and 2013, (2) applies the same background and induced incidence rates used for eligible living former players to the deceased players retrospectively based on their age to determine a diagnosis date of a terminal or lesser disease, (3) applies the age discount (based on the estimated age at diagnosis) and the discount for years played, and (4) applies estimated participation rates.[8]

[8] The participation rates for deceased players who have not filed a claim is the same as that used for eligible living players who have not filed (50%) based on the assumption that living family members or the player's estate may file a representative claim. For deceased players in this category who died prior to 2006, it is assumed that 20% of those who participate will be able to successfully demonstrate to the Claims Administrator that their claims are not time barred under the applicable statute of limitations, and thus establish their eligibility for compensation. For deceased claimants who have filed a claim and were diagnosed with a compensable disease the participation rate is 100%. For deceased claimants who did not provide a diagnosis, the participation rate is assumed to be 95%.

The total compensation amount for all eligible former NFL players is determined by summing the compensation amounts for each player year-by-year.

The key inputs to the model are:

- Player data including age and years played in the NFL
- Background incidence for each of the compensable diseases
- Induced incidence from concussions for each of the compensable diseases
- Compensation amounts for each disease with adjustments for age and years played

Player data was derived from a combination of several authoritative sources. The sources, data, and methods used to identify the population of players who are potentially eligible for compensation are described in detail in section 4 of this report.

The incidence rates for each of the compensable diseases are determined by combining the background incidence rate for each disease with the induced incidence rate for each disease from concussion-related injuries. Because the compensable diseases have been the subject of numerous epidemiological studies, there is a reasonable amount of research available to effectively determine incidence rates by age. An extensive review of the available literature and research was conducted as part of this analysis to determine the incidence of each disease by age.

There is far less quantitative data available concerning the induced incidence of these diseases caused by concussive injuries. A review of the available research in this area, particularly with respect to football-related injuries and concussions, was undertaken. However, it was still necessary to make some assumptions regarding induced incidence rates.

The sources of data and assumptions that have been applied in the life cycle model to determine incidence rates are described in further detail in section 5 and Appendix A of this report.

The compensation amounts used in the analysis for each disease are based on the compensation matrix in the Settlement Agreement. These compensation amounts include adjustments for age at the date of diagnosis to account for background incidence and for years played in the NFL to account for risk exposure. A further description of the compensation amounts and the adjustment factors is presented in section 6 of this report.

4. Database of Former Players, Living and Deceased

Database of Former Players

An essential input for the analysis is a comprehensive database of information about the population of former NFL players who are eligible for the settlement. In this case extensive historical data are available from a variety of authoritative sources, and it has been possible to combine different databases to compile the relevant information for the entire population of

former NFL players, including those still living and those that are deceased. The population of former NFL players was identified by combining information from four primary sources: (1) the database of NFL players who had already filed claims during the pre-settlement period,[9] (2) the NFL player database owned and maintained by STATS, Inc.,[10] (3) a database of former players provided by the NFL, and (4) a database of practice/development squad players also provided by the NFL. These four databases were merged, duplicate records were removed, and additional research and analysis was done to update deficient player records to produce the most complete list of former NFL players possible.

This analysis identified a total of 21,070 former NFL players who may be eligible for compensation. As shown in Table 4-1, this included 19,434 players who are currently alive or are deceased but have filed a claim, and 1,636 players who died between the years 2000 to 2013 but have not filed a claim.

Table 4-1
Former Players Potentially Eligible for Compensation

Source	Count
Living	
Database of players who filed claims[1]	4,207
NFL Database	13,340
STATS Database	1,349
NFL Practice/Develoment Squad Database	538
Subtotal	19,434
Deceased, 2000-2013	1,636
Grand Total	21,070

[1] This count includes 76 former NFL players who are deceased that have filed a claim.

In this analysis it has been assumed that former players, who were deceased in the period from 2000 to 2013, including those with a diagnosis of CTE, are eligible for compensation. Former

[9] Since this analysis was completed additional claims have been filed by former NFL players and their representatives and claims continue to be filed. These players are included in the population used in the analysis and do not affect the outcome.
[10] STATS Inc. is a service provider to the NFL that collects and maintains game and player statistics. STATS, Inc. is considered one of the leading sources of historical, current and real-time sports data and statistics.

players who died prior to 2006 are not eligible under the Settlement Agreement absent a separate determination of eligibility.

The STATS and NFL databases include more data items than were needed for this analysis. The analysis makes use of variables such as age, date of birth, date of death, number of years played, and specific years played.

In merging the databases from the different sources, a number of issues were encountered:

- In the database of claims already filed, 206 of the records did not match to the NFL or STATS databases. Among these 40% provided no playing history. However, based on further research playing history was found for 17%. For 80% of the 206 cases, reference to the player's football experience was found through online sources. None of the unmatched cases were removed from the database.
- There were a total of 3,700 players included in the NFL database but not in the STATS database. Of these, 40% were practice players. Nearly all of the non-practice players had fewer than 2 seasons playing experience.
- Merging the three databases indicates that there may be an additional 1,349 eligible living inactive players. However, this count may be an overstatement for two reasons: (1) some STATS players may be deceased, but have no recorded date of death and, (2) some STATS players may be currently employed by the NFL.

There were also a number of issues encountered with respect to the deceased players in the databases. The STATS database included information for 5,930 deceased players dating as far back as 1925. The NFL database included only 1,617 deceased former players but it covered a shorter historical period. The NFL database contains player records only since 1980 while the STATS database includes some 2,286 records for players deceased prior to 1980. In the more recent period beginning in 2000, the STATS database includes 1,515 deceased player records compared to 981 in the NFL database. Merging, matching and de-duplicating the NFL, STATS and filed claims data sets identified a total of 1,636 non-filing deceased players who died in the period from 2000 to 2013.

Profile of Former NFL Players – Age and Eligible Seasons Played

The analysis examines the entire life cycle of each living former NFL player in the population in order to determine whether he will die of natural causes or be diagnosed with a compensable disease and when that will happen. Importantly, as discussed elsewhere in this report, the amount of any monetary award is highly dependent on the age of a player when he is diagnosed with a compensable disease and on the number of years he played in the NFL.

Table 4-2 below shows the current age profile of former players grouped into different categories – all players, non-filing players that are currently living, players that have already filed claims, and players that are deceased and no claim has been filed on their behalf. As this table shows,

the average age of all players is 50.5 years, and 36% of all players are currently aged 55 or older. For those who are 55 or older, the age discount reduces the maximum award amount by approximately two-thirds (except in the rare cases of ALS).

Table 4-2
Profile of Former NFL Players by Age

	All Players		Living/Not Yet Filed		Already Filed		Deceased/Not Yet Filed	
Age	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Under 45	8,354	40%	6,744	44%	1,502	36%	108	7%
45 - 49	2,368	11%	1,831	12%	487	12%	50	3%
50 - 54	2,802	13%	2,095	14%	657	16%	50	3%
55 - 59	1,794	9%	1,261	8%	458	11%	75	5%
60 - 64	1,514	7%	1,026	7%	371	9%	117	7%
65 - 69	1,291	6%	824	5%	330	8%	137	8%
70 - 74	1,007	5%	604	4%	220	5%	183	11%
75 - 79	769	4%	419	3%	129	3%	221	14%
80+	1,171	6%	423	3%	53	1%	695	42%
Total	21,070	100%	15,227	100%	4,207	100%	1,636	100%
Average Age	50.5		47.9		51.0		73.3	

Table 4-3 below shows the profile of former players based on the number of years played in the NFL,[11] also grouped into the four different categories: all players, players who have not yet filed and are currently living, players that have already filed claims, and players that are deceased and no claim has been filed on their behalf. As this table shows, the average number of years played for all players is 4.1 years and 48% of all players played less than 3 years. For those who played less than 3 years, the years played discount reduces the maximum award amounts by 50% to 90%. The average number of years played for the 15,227 currently living players who have not yet filed was 3.4 years, which would result in a years-played discount of 40% on average from the maximum award amounts.

[11] The Settlement Agreement uses the concept of "eligible season" in determining whether to apply any discount. In the Settlement Agreement, an "eligible season" is a season in which the player was on the active roster for 3 or more regular season or postseason games, or on the practice squad roster for 8 or more games. The databases of former NFL players generally identified the calendar years that a player played. The analysis performed herein uses calendar years as the basis for determining the number of eligible seasons and therefore may overestimate the number of eligible seasons played.

Table 4-3

Profile of Former NFL Players by Years Played

Years Played[1]	All Players		Living/Not Yet Filed		Already Filed		Deceased/Not Yet Filed	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
<1	2,247	11%	2,200	14%	39	1%	8	0%
1	5,041	24%	4,287	28%	238	6%	516	32%
2	2,719	13%	2,198	14%	321	8%	200	12%
3	1,940	9%	1,407	9%	392	9%	141	9%
4	1,564	7%	946	6%	476	11%	142	9%
5	1,366	6%	804	5%	443	11%	119	7%
6	1,232	6%	650	4%	477	11%	105	6%
7	965	5%	519	3%	357	8%	89	5%
8	889	4%	475	3%	340	8%	74	5%
9	802	4%	452	3%	289	7%	61	4%
10	679	3%	361	2%	271	6%	47	3%
>10	1,626	8%	928	6%	564	13%	134	8%
Total	21,070	100%	15,227	100%	4,207	100%	1,636	100%
Average Years Played	4.1		3.4		6.3		4.3	

[1]Players who played an additional 0.5 years are included in the higher years played figure, e.g., a player who played 3.5 years is reported here as having played 4 years.

5. Incidence of Compensable Diseases

In order to forecast the timing and amount of monetary compensation that will be required to resolve the claims of former NFL players it is necessary to determine the incidence of compensable diseases for the population of former players over the lifetime of that population. This involves two steps:

- Determining the background incidence of the compensable diseases in the population. The background incidence represents the rate at which these diseases are expected to arise naturally in the population, including former NFL players.
- Determining the additional incidence of the compensable diseases that will arise in the population of former NFL players due to concussions – referred to as induced incidence or risk multiplier.

Compensable Injuries

The Settlement Agreement identifies 6 diagnostic categories as the compensable diseases:

- ALS

- Death with CTE[12]
- Parkinson's
- Alzheimer's
- Level 2 Neurocognitive Impairment[13]
- Level 1.5 Neurocognitive Impairment

For each of these diseases extensive review of the medical and scientific literature was performed to estimate the background and induced incidence rates.

The following sections describe the approach used to determine the background incidence, induced incidence and total incidence estimated for the population of former NFL players.

Background Incidence

To determine background incidence, this analysis has relied upon the best available published literature and research. A detailed description of the sources and methods used to determine background incidence is provided in Appendix A. The most severe diseases, referred to as terminal diseases, are defined in the Diagnostic and Statistical Manual -V (DSM-5) and the World Health Organization's International Classification of Diseases (9^{th} and 10^{th} editions) (ICD-9 and ICD-10). Because there has generally been extensive research and study of these diseases, information on background incidence rates (or prevalence rates) is reasonably available. As described in Appendix A, in order to arrive at a consistent measure and application of incidence rates, certain methods and assumptions were made including:

- Converting Prevalence to Incidence – in cases where only prevalence data were available, prevalence was converted to incidence.
- Extrapolating data for older age groups to younger ages – in cases where data were available only for specific older populations (*e.g.*, over age 65), the incidence was extrapolated to younger ages by defining the rate for 20-year-olds as $1/100^{th}$ of the rate for 65-year-olds and increasing the rate through this age range by fitting an exponential curve.
- Exponential smoothing of data aggregated by age ranges – for diseases where data were provided only by age ranges, the incidence rate was assigned to the midpoint of the age range and extrapolated to each age by fitting an exponential curve.
- Adjustment for history of stroke – because Alzheimer's and neurocognitive disorders are sometimes attributed to a prior history of stroke, the incidence of these diseases was adjusted to account for this joint causality. According to epidemiological research, 9.1%

[12] Under the terms of the Settlement Agreement, only pre-settlement diagnoses of Death with CTE are eligible for compensation. Accordingly, the analysis does not forecast future cases of Death with CTE, and there is no corresponding induced incidence prospectively. Also, this analysis used confirmed cases of CTE.
[13] Estimates of the incidence of Level 1.5 and Level 2 neurocognitive disorders were based on incidence for dementia as described in the methodology section of this report.

of Alzheimer's patients and 8.4% of dementia patients had a history of stroke prior to the onset of these diseases. Since compensation to claimants who have a prior stroke history will be discounted by 75%, the overall incidence of Alzheimer's and dementia was adjusted to account for this instead of forecasting them separately. The incidence of Alzheimer's and dementia were reduced by an amount equal to 75% of the number of cases with joint causality (*i.e.,* 25% of those with a prior history of stroke are included in the background incidence).

- Adjustment for Traumatic Brain Injury (TBI) – The Settlement Agreement provides a 75 percent discount to monetary award amounts in cases where there has been a prior incident of TBI for all disease categories except ALS. This analysis did not assume any adjustments for prior incidence of TBI. Therefore to the extent that such cases occur, the analysis will tend to overestimate the total cost of monetary awards.

Induced Incidence

Research and literature concerning the potential increased incidence for the compensable diseases is limited, and some of it has historically been controversial. In this analysis peer-reviewed literature has been given priority, and controversial studies have been excluded. Studies of comparable sports injuries have also been relied upon. However, it was still necessary to develop and apply assumptions concerning the induced risk effect of concussions among former NFL players.

For Alzheimer's disease, Parkinson's and dementia, a risk multiple of 2.0 for ages 20 through 60 was used. After age 60, the risk multiple was assumed, based on available literature, to be more additive than multiplicative, and so the adjusted induced incidence is calculated as the background incidence at those ages, plus the incremental difference between the incidence rates at age 60 for each of the diseases. For ALS, a similar methodology was applied for the various ages, but using a multiplier for ages 20-60 of 1.4.

A detailed description of the sources and methods used to determine background incidence is provided in Appendix A.

Total Incidence

For each of the compensable diseases, the background incidence and induced incidence were combined to yield the total incidence among former NFL players. A summary of the incidence and counts of players for each compensable disease for the most serious injury/disease type is shown in Table 5-1 below. In cases where players contracted more than one type of injury, only the most serious injury is included here (*i.e.,* no double counting).

Table 5-1
Estimated Total Incidence by Injury/Disease Type for Former NFL Players

Most Serious Injury/ Disease Type	Total Incidence - Background and Induced	
	Count	%
ALS	31	0.15%
Death w/CTE	46	0.22%
Parkinson's	24	0.11%
Alzheimer's	2,946	13.98%
Level 2	2,878	13.66%
Level 1.5	0	0.00%
Deceased, No Disease	15,145	71.88%
Total	21,070	100.00%

Note: All Level 1.5 are assumed to progress to Level 2, therefore the incidence count is the same for both impairment levels

As the table shows, taking into account both background and induced incidence, approximately 72% of the total population of former NFL players will die of natural causes unrelated to one of the compensable diseases. Of the 28% who it is estimated will be diagnosed with a compensable disease, 49% (2,878) will be diagnosed with Level 2 neurocognitive disorder as their most severe compensable disease. It is estimated that 3,047 former NFL players will be diagnosed with one of the severe terminal diseases – about 97% of those being diagnosed with Alzheimer's.

Total Incidence by Disease

To determine how the incidence of each of the compensable diseases will affect the cash flow requirements for claim resolution it is critical to know how many cases will be diagnosed each year and then to compute the discounts that would be applied to the compensation amount for the players' age and number of years played in the NFL. The life cycle forecasting model estimates this for each player and each year. The following tables summarize the incidence and provide averages of players' ages and years played for each disease. For each of these tables, the columns represent the following:

- Year of Diagnosis – the period of years for which the incidence data have been summarized.

- Players Still Living – count of players who are alive at the beginning of the period. Over the course of each period, the count of players is reduced by the number who are deceased by any cause.
- Number Diagnosed – the number of players who will be diagnosed with that particular disease during the period (prior to application of participation rates).
- Percent Diagnosed – the percent of players still living at the beginning of the period who are diagnosed with the disease during the period.
- Average Age – the average age of the players who are diagnosed with the disease during the period.
- Average Years Played – the average number of years played in the NFL by the players diagnosed with the disease during the period.

Players may be diagnosed with more than one compensable injury/disease over time. For example, a former player may qualify for Level 2.0 and then contract Alzheimer's later in life. Most of the counts shown in the tables of this report include only the most severe compensable disease that a player contracts in his lifetime. In the example above, the player is counted only as contracting Alzheimer's in Table 5-1 even though he had a prior diagnosis of Level 2.0. However, compensation is paid at the time each disease is contracted. If the player is first diagnosed with a neurocognitive disorder and is then later diagnosed with an even more serious disease, he is paid at the time of the initial diagnosis and then he is paid again at the time of the more serious disease diagnosis. The second payment for the more serious disease diagnosis is a net amount that recognizes he had already received some compensation for his injuries.

Tables 5-2 through 5-7 show the incidence of all injuries. The same player discussed above who was only counted as having contracted Alzheimer's, will be counted twice in the examples below – once as he is eligible for Level 2.0 and again when he contracts Alzheimer's. This potential double counting means that the disease counts in Tables 5-2 through 5-7 exceed the counts in Table 5-1 and other tables in the report that count only the most serious injury.

Table 5-2 shows the estimated incidence of ALS by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 36 cases of ALS among former NFL players who have an average age of 60 and played an average of 4.3 years.

Table 5-2
Total Incidence and Profile for ALS, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	6	0.03%	48.0	3.7
2006 - 2010	20,343	4	0.02%	50.8	8.3
2011 - 2020	19,699	3	0.02%	56.7	2.0
2021 - 2030	17,595	6	0.03%	48.8	5.6
2031 - 2040	14,501	6	0.04%	62.7	3.3
2041 - 2050	10,635	4	0.04%	69.8	2.4
2051 - 2060	6,632	5	0.08%	77.2	5.3
2061 - 2070	3,114	2	0.06%	82.5	2.3
2071 - 2080	850	0	0.00%	-	-
2081 +	67	0	0.00%	-	-
Total		36	0.17%	60.0	4.3

Table 5-3 shows the estimated incidence of Death with CTE and a profile of the average ages and years played for players diagnosed with this disease. In the case of Death with CTE, this analysis assumes that only those cases that had a confirmed diagnosis pre-settlement will be compensated. Therefore the model does not forecast any futures cases of CTE. As the table shows, there are 46 cases of Death with CTE among former NFL players who have an average age of 60.3 and have played an average of 7.9 years.

Table 5-3
Total Incidence and Profile for Death with CTE, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	3	0.00%	44.0	11.3
2006 - 2010	20,343	18	0.00%	57.7	7.3
2011 - 2020	19,699	25	0.00%	64.1	8.0
2021 - 2030	17,595	0	0.00%	-	-
2031 - 2040	14,501	0	0.00%	-	-
2041 - 2050	10,635	0	0.00%	-	-
2051 - 2060	6,632	0	0.00%	-	-
2061 - 2070	3,114	0	0.00%	-	-
2071 - 2080	850	0	0.00%	-	-
2081 +	67	0	0.00%	-	-
Total		46	0.00%	60.3	7.9

Note: This analysis assumes that only those cases that had a confirmed diagnosis pre-settlement will be compensated. Therefore, no future cases of Death with CTE have been forecast for compensation.

Table 5-4 shows the estimated incidence of Parkinson's by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 25 cases of Parkinson's among former NFL players who have an average age of 75.5 and played an average of 4.9 years.

Table 5-4
Total Incidence and Profile for Parkinson's, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	1	0.00%	56.0	10.0
2006 - 2010	20,343	2	0.01%	78.5	6.0
2011 - 2020	19,699	4	0.02%	81.5	5.5
2021 - 2030	17,595	6	0.03%	71.3	5.3
2031 - 2040	14,501	3	0.02%	72.0	7.0
2041 - 2050	10,635	4	0.04%	80.3	3.9
2051 - 2060	6,632	3	0.05%	72.7	2.7
2061 - 2070	3,114	2	0.06%	83.0	1.3
2071 - 2080	850	0	0.00%	-	-
2081 +	67	0	0.00%	-	-
Total		25	0.12%	75.5	4.9

Table 5-5 shows the estimated incidence of Alzheimer's by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 2,949 cases of Alzheimer's among former NFL players who have an average age of 77.9 and played an average of 4.1 years.

Table 5-5
Total Incidence and Profile for Alzheimer's, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	163	0.77%	73.6	3.7
2006 - 2010	20,343	48	0.24%	76.8	3.8
2011 - 2020	19,699	314	1.59%	72.7	5.0
2021 - 2030	17,595	431	2.45%	72.2	4.6
2031 - 2040	14,501	562	3.88%	75.9	4.3
2041 - 2050	10,635	556	5.23%	79.0	4.3
2051 - 2060	6,632	479	7.22%	82.1	3.9
2061 - 2070	3,114	296	9.51%	84.8	3.1
2071 - 2080	850	94	11.06%	90.1	2.1
2081 +	67	6	8.96%	95.7	1.3
Total		2,949	14.00%	77.9	4.1

Table 5-6 shows the estimated incidence of Level 2 neurocognitive disorders by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 3,354 cases of Level 2 disorders diagnosed among former NFL players who have an average age of 77.2 and played an average of 4.2 years. The incidence of neurocognitive disorders was estimated using data for the incidence of dementia as a proxy for Level 2 disorders. It was also further assumed that Level 2 disorders are progressive and every case would initially be diagnosed as a Level 1.5 disorder. In this analysis, incidence of dementia were treated as Level 2 disorders and then regressed backward by 3 years to determine the onset of the Level 1.5 disorder. The result of this can be seen in Table 5-7 where the number of diagnosed cases of Level 1.5 disorders is the same 3,354 as for Level 2.0, but the average age is 3 years younger at 74.2.

Table 5-6
Total Incidence and Profile for Level 2, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	206	0.98%	74.5	3.5
2006 - 2010	20,343	71	0.35%	67.4	5.7
2011 - 2020	19,699	334	1.70%	73.6	5.2
2021 - 2030	17,595	541	3.07%	75.2	4.9
2031 - 2040	14,501	615	4.24%	75.3	4.3
2041 - 2050	10,635	648	6.09%	77.5	4.0
2051 - 2060	6,632	537	8.10%	80.1	4.1
2061 - 2070	3,114	325	10.44%	83.9	2.9
2071 - 2080	850	72	8.47%	88.3	1.9
2081 +	67	5	7.46%	95.8	1.4
Total		3,354	15.92%	77.2	4.2

Table 5-7
Total Incidence and Profile for Level 1.5, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	237	1.12%	70.7	3.8
2006 - 2010	20,343	71	0.35%	61.4	6.2
2011 - 2020	19,699	452	2.29%	71.9	5.0
2021 - 2030	17,595	571	3.25%	72.3	4.8
2031 - 2040	14,501	631	4.35%	72.7	4.3
2041 - 2050	10,635	638	6.00%	75.2	4.0
2051 - 2060	6,632	486	7.33%	78.2	3.7
2061 - 2070	3,114	230	7.39%	82.4	2.7
2071 - 2080	850	38	4.47%	87.2	1.4
2081 +	67	0	0.00%	-	-
Total		3,354	15.92%	74.2	4.2

6. Compensation

Compensation of Living Former Players

The compensation amounts used in the analysis are found in Exhibit 3 to the Settlement Agreement. This Monetary Award Grid (Grid) is shown in Table 6-1 below. The Grid defines maximum amounts to be paid to former players based upon their diagnoses. These maximum amounts are then subject to adjustments based on two discount factors: (1) the player's age at the time of diagnosis, and (2) the number of years played in the NFL. These adjustment factors were considered appropriate to account for background incidence and exposure risk.

Players who are diagnosed with a compensable disease before the age of 45, and played in the NFL for 5 or more years are eligible for the maximum compensation amounts. Adjustments are made for each year above the age of 45, and there is a further reduction to the compensation amount for each half year of playing time less than 5 years.

Table 6-1 below shows the maximum amounts to be paid under the compensation matrix for each disease category at different age ranges.[14]

Table 6-1
Monetary Award Grid, by Age at Time of Qualifying Diagnosis

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5
Under 45	$5,000,000	$4,000,000	$3,500,000	$3,500,000	$3,000,000	$1,500,000
45 - 49	$4,500,000	$3,200,000	$2,470,000	$2,300,000	$1,900,000	$950,000
50 - 54	$4,000,000	$2,300,000	$1,900,000	$1,600,000	$1,200,000	$600,000
55 - 59	$3,500,000	$1,400,000	$1,300,000	$1,150,000	$950,000	$475,000
60 - 64	$3,000,000	$1,200,000	$1,000,000	$950,000	$580,000	$290,000
65 - 69	$2,500,000	$980,000	$760,000	$620,000	$380,000	$190,000
70 - 74	$1,750,000	$600,000	$475,000	$380,000	$210,000	$105,000
75 - 79	$1,000,000	$160,000	$145,000	$130,000	$80,000	$40,000
80+	$300,000	$50,000	$50,000	$50,000	$50,000	$25,000

Table 6-2 below shows the percentage discount applied to the compensation amounts based on the number of years played. This ranges from a zero percent discount for 5 or more playing

[14] Table 6-1 shows average amounts over five year ranges. The actual award grid provides different amounts for each age from 45 to 80.

years up to a 90 percent reduction in the payment amount for those who played 0.5 years or less.[15]

Table 6-2
Discounts to Monetary Awards for Years Played in the NFL

Years Played	Discount	All Players	
		Count	Percent
5+	0%	7,496	36%
4.5	10%	62	0%
4.0	20%	1,449	7%
3.5	30%	115	1%
3.0	40%	1,719	8%
2.5	50%	221	1%
2.0	60%	2,209	10%
1.5	70%	511	2%
1.0	80%	5,041	24%
0.5	90%	2,247	11%
Total		21,070	100%

The Effect of Age, Years Played in the NFL and Inflation on Settlement Amounts

The Settlement Agreement provides maximum monetary awards to players who are less than 45 years old when they are diagnosed with a compensable disease and have played in the NFL for 5 or more years. There is a reduction in the compensation levels based on age and years played beginning with players age 45 or older and players with less than 5 years of experience in the NFL. The Settlement Agreement also provides for an escalation in the compensation amounts to adjust for inflation. These adjustments have a significant effect on the average amount of compensation paid to the former players and a corresponding significant effect on the total compensation paid by the fund.

The magnitude of the effect of age, playing time and inflation depends heavily on the average age of the players when contracting a compensable disease, the number of years the individual played in the NFL and the year the disease is contracted. Table 6-3 summarizes these variables.

[15] Players who played on practice squads were assigned 0.5 years of eligible playing time for each year on a practice squad. The Settlement Agreement applies a 97.5% reduction for players with no eligible seasons. I have assumed that all players have at least 0.5 years played.

The table shows the average age at the time of diagnosis with the most serious disease is approximately 77 years of age for both groups. Therefore due to the average age at the time of onset of the disease, compensation amounts are subject to significant reductions from the maximum awards.

Table 6-3 also shows that 60% of all players estimated to receive compensation have fewer than the 5 years needed to receive the maximum monetary award. The years played variable shows that the players that have already filed have significantly more years played in the NFL than the future filers.

Table 6-3
Selected Characteristics of Former Players:
Age, Years Played and Year of Contracting Disease/Injury

	Age At:		Years Played		
Player Category	2014 or at Death	Year of Most Serious Injury	Percent of Players with Less Than 5 Years Played	Average Years Played	Year of Most Serious Injury
Already Filed	52.0	76.3	35%	6.3	2037
Future Filer	51.2	77.7	73%	3.5	2039
All Filers	51.4	77.4	60%	4.4	2039

Table 6-4 shows the effect of these adjustments for age and years played. Without any adjustments, players would be compensated at the maximum value for their injury – shown in the table as the Maximum Monetary Award.

Table 6-4
Effect of Age, Years Played and Inflation on Average and Total Compensation
by Injury Category

		Value After Age Adjustment		Value After Age and Years Played Adjustment		Actual Final Value	
Most Serious Injury/ Disease	Maximum Monetary Award	Average Payment	Total Compensation ($ millions)	Average Payment	Total Compensation ($ millions)	Average Payment	Total Compensation ($ millions)
Compensable Injury/Disease							
ALS	$5,000,000	$2,930,000	$52.8	$2,120,000	$38.1	$2,740,000	$49.4
Death w/CTE	$4,000,000	$1,910,000	$85.8	$1,440,000	$64.9	$1,440,000	$64.9
Parkinson's	$3,500,000	$320,000	$4.5	$190,000	$2.7	$230,000	$3.2
Alzheimer's	$3,500,000	$340,000	$593.8	$190,000	$340.7	$270,000	$474.9
Level 2	$3,000,000	$210,000	$368.8	$140,000	$246.5	$190,000	$341.0
Level 1.5	$1,500,000	na	na	na	na	na	na
Total, Compensable	na	na	$1,105.7	na	$693.0	na	$933.4

Note: All Level 1.5 are assumed to progress to Level 2. All compensation categorized by most serious injury

For example, the average payment for diagnosed cases of ALS is $2.93 million rather than the maximum award amount of $5 million - a 40% reduction. The average age-adjusted payment for players being diagnosed with Alzheimer's is $0.34 million, about 90% less than the maximum award amount of $3.5 million.

Adjusting for years played has a less substantial effect on award values after the age adjustment. For example as Table 6-4 shows, for former players diagnosed with ALS the average payment after the adjustment for number of years played is $2.1 million – a 28% reduction. The average payment to players diagnosed with Alzheimer's disease is reduced from $0.34 million to $0.19 million.

Finally, adjusting for inflation increases average and total compensation. Again, as Table 6-4 shows, adjusting for inflation increases average payments by approximately 30% for ALS and 40% for Alzheimer's, 20% for Parkinson's, no change for death with CTE and approximately 40% for Level 2 neurocognitive disorders. However, the actual final average award amounts for each disease are significantly below the maximum monetary award amounts, resulting in an inflation adjusted total compensation amount of $933.4 million.

Table 6-5 shows the Monetary Award Grid as it would apply to players who played 3 years in the NFL, *i.e.,* after the discount for 3 playing years is applied. As this table shows, the maximum compensation amounts are 40% lower than the Maximum Award Grid for players who played 5 years or more.

Table 6-5
Monetary Award Grid, for Players who Played 3 years in NFL at Time of Qualifying Diagnosis[1]

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5
Under 45	$3,000,000	$2,400,000	$2,100,000	$2,100,000	$1,800,000	$900,000
45 - 49	$2,700,000	$1,920,000	$1,480,000	$1,380,000	$1,140,000	$570,000
50 - 54	$2,400,000	$1,380,000	$1,140,000	$960,000	$720,000	$360,000
55 - 59	$2,100,000	$840,000	$780,000	$690,000	$570,000	$290,000
60 - 64	$1,800,000	$720,000	$600,000	$570,000	$350,000	$170,000
65 - 69	$1,500,000	$590,000	$460,000	$370,000	$230,000	$110,000
70 - 74	$1,050,000	$360,000	$290,000	$230,000	$130,000	$60,000
75 - 79	$600,000	$100,000	$90,000	$80,000	$50,000	$20,000
80+	$180,000	$30,000	$30,000	$30,000	$30,000	$15,000

[1]Assumes no other offsets for stroke, TBI, or non-participation in BAP.

Table 6-6 shows the estimated average value of monetary awards that will be paid for each disease across the various age groups. These average awards take into account both the age discount and the years played discount.

Table 6-6
Average Monetary Awards by Age Group at Time of Qualifying Diagnosis for All Players, Fully Discounted

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5
Under 45	$2,860,000	$2,870,000	na	$1,600,000	$2,980,000	$1,490,000
45 - 49	$2,390,000	$3,490,000	na	$1,160,000	$1,540,000	$770,000
50 - 54	$2,160,000	$1,810,000	$452,000	$740,000	$830,000	$420,000
55 - 59	$610,000	$2,120,000	$1,420,000	$500,000	$490,000	$250,000
60 - 64	$1,060,000	$670,000	na	$430,000	$310,000	$160,000
65 - 69	$520,000	$1,100,000	$200,000	$270,000	$140,000	$70,000
70 - 74	$470,000	$550,000	$100,500	$150,000	$80,000	$40,000
75 - 79	$280,000	$160,000	$106,800	$50,000	$20,000	$10,000
80+	$50,000	$40,000	$22,500	$10,000	$10,000	$10,000

[1]Note the analysis assumes that all Level 1.5 claimants progress to more serious injuries. Thus all Level 1.5 amounts are fully netted against the amounts computed for the players ultimate most serious injury.
na - No former players were in this age/injury category

Table 6-7 shows the estimated total amount of the monetary awards that will be paid for each disease in each age group. These total award amounts take into account both the age discount and the years played discount.

Table 6-7
Total Monetary Awards by Age Group at Time of Qualifying Diagnosis for All Players, Fully Discounted

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5[1]
Under 45	$17,140,000	$22,980,000	na	$43,100,000	$50,650,000	$25,330,000
45 - 49	$7,180,000	$13,950,000	na	$37,250,000	$16,890,000	$8,450,000
50 - 54	$6,490,000	$10,840,000	$452,000	$43,800,000	$20,630,000	$10,320,000
55 - 59	$610,000	$6,370,000	$1,420,000	$62,570,000	$32,540,000	$16,270,000
60 - 64	$4,220,000	$2,010,000	na	$58,350,000	$38,440,000	$19,220,000
65 - 69	$2,080,000	$5,490,000	$600,000	$58,140,000	$45,420,000	$22,710,000
70 - 74	$1,890,000	$2,740,000	$402,000	$45,220,000	$31,060,000	$15,530,000
75 - 79	$280,000	$1,140,000	$534,000	$23,350,000	$12,990,000	$6,500,000
80+	$250,000	$210,000	$225,000	$20,810,000	$17,460,000	$8,730,000

[1]Note the analysis assumes that all Level 1.5 claimants progress to more serious injuries. Thus all Level 1.5 amounts are fully netted against the amounts computed for the player's ultimate most serious injury.
na - No former players were in this age/injury category

Examples of Monetary Award Calculations

In order to illustrate how the monetary award computation is applied, several hypothetical cases are presented in the following tables. For simplicity, it is assumed that the diagnosis occurs in 2013 or earlier. This means that the nominal amounts are not inflated since the inflation adjustment starts in 2014. These examples show the following four cases:

Table 6-8A shows the monetary award calculation in the case of a 40-year-old player who had 7 playing years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, there would be no age or years played discount and no joint causality discount, so the player would receive the maximum matrix award value.

Table 6-8A
Example of Monetary Award Calcuation
Case: 40 years old, 7 years playing, Alzheimer's diagnosis, no Prior Stroke or TBI

	%	Amount
Maximum Disease Compensation	100%	$3,500,000
Less: Age Discount	0%	$0
Less: Years Played Discount	0%	$0
Less: Prior Stroke/TBI Discount	0%	$0
Final Award (% of Maximum/Payment Amount)	100%	$3,500,000

Table 6-8B shows the monetary award calculation in the case of a 57-year-old who played in the NFL for 3.5 years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, an age discount of 67% is applied and there is a discount for years played of 30%. The resulting payment would be 23% of the full matrix value (a 77% discount from maximum value).

Table 6-8B
Example of Monetary Award Calcuation
Case: 57 years old, 3.5 years playing, Alzheimer's diagnosis, no Prior Stroke or TBI

	%	Amount
Maximum Disease Compensation	100%	$3,500,000
Less: Age Discount	-67%	-$2,350,000
Less: Years Played Discount	-30%	-$345,000
Less: Prior Stroke/TBI Discount	0	$0
Final Award (% of Maximum/Payment Amount)	23%	$805,000

Table 6-8C shows the monetary award calculation in the case of a 62-year-old who played in the NFL for 2 years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, an age discount of 73% is applied and there is a discount for years played of 60%. The resulting payment would be 11% of the full matrix value (an 89% discount from maximum value).

Table 6-8C
Example of Monetary Award Calcuation
Case: 62 years old, 2 years playing, Alzheimer's diagnosis, no Prior Stroke or TBI

	%	Amount
Maximum Disease Compensation	100%	$3,500,000
Less: Age Discount	-73%	-$2,550,000
Less: Years Played Discount	-60%	-$570,000
Less: Prior Stroke/TBI Discount	0	$0
Final Award (% of Maximum/Payment Amount)	11%	$380,000

Table 6-8D shows the monetary award calculation in the case of a 72-year-old who played in the NFL for 10 years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, an age discount of 89% is applied and there is no discount for years played because he played more than 5 years. The resulting payment would be 3% of the full matrix value (a 97% discount from maximum value).

Table 6-8D
Example of Monetary Award Calcuation
Case: 72 years old, 10 years playing, Alzheimer's diagnosis, with Prior Stoke

	%	Amount
Maximum Disease Compensation	100%	$3,500,000
Less: Age Discount	-89%	-$3,120,000
Less: Years Played Discount	0%	$0
Less: Prior Stroke/TBI Discount	-75%	-$285,000
Final Award (% of Maximum/Payment Amount)	3%	$95,000

7. Cost Estimate

The analysis forecasts that a total of 3,596 former NFL players who participate in the settlement will contract compensable diseases over the life of the program. The majority of these compensable diseases, about 98%, will be cases of Alzheimer's or Level 2 neurocognitive disorders. The total nominal cost for all compensable diseases including administration costs is estimated to be $933 million over the life of the program.

Total Compensable Claims and Compensation

Table 7-1 provides a summary of compensable claims and total compensation by type of injury. The overwhelming percent of compensable claims and compensation are paid to former players with Alzheimer's disease or Level 2 neurocognitive disorders – 98% of compensable claims and 87% of compensation. The distribution of claims reflects the relative probabilities of the occurrence of the various diseases in the general population combined with the additional incidence related to concussions.

Table 7-1
Former Players with Compensable Concussion-Related Injury
by Type of Injury with Total Compensation
($ millions)

Most Serious Injury/ Disease	Total Claims		Total Compensation	
	Count	Percent	Amount	Percent
Compensable Injury/Disease				
ALS	18	0.5%	$49.4	5.3%
Death w/CTE	46	1.3%	$64.9	7.0%
Parkinson's	14	0.4%	$3.2	0.3%
Alzheimer's	1,757	48.9%	$474.9	50.9%
Level 2	1,761	49.0%	$341.0	36.5%
Level 1.5	na	na	na	na
Total, Compensable	3,596	100.0%	$933.4	100.0%
Not Compensated	17,474	na	na	na
Grand Total	21,070	na	$933.4	100.0%

Note: All compensation categorized by most serious injury. All Level 1.5 claims are assumed to progress to Level 2 and more serious levels. $248 million is paid to former players at Level 1.5. This amount is included in the category of their most serious disease as follows: $212 milion paid at Level 2; $34 million to Alzheimer's and $2 million to other disease types. Players are not compensated because they did not experience a compensable injury or did not file a claim.

Timing of Compensation Payments and Funding

Table 7-2 shows the timing of payments to former players and the receipt of funding by the settlement fund through the payment of the last compensable claim. The timing and total amount of funding are sufficient to pay all claims.

- Compensation payments in the first five years are high because there are a relatively large number of former NFL players who have indicated they intend to file a claim. These claimants include former players who have already been diagnosed with a disease and will be paid in the first few years of the settlement fund. After these claims are resolved, the fund will be receiving and paying claims at a significantly lower rate as the filing of future claims depends on the timing of the manifestation of future compensable injuries.
- The initial funding amount of approximately $364 million (55% of the total funding) is designed to provide enough assets to pay the compensable claims already identified and to cover the startup costs of the claim processing facility while still leaving a significant

asset. The remaining assets are supplemented with an additional $311 million, which is paid in annual installments through 2033. At that time the remaining assets of the settlement fund (with earnings) are sufficient to pay all remaining claims.

- The Fund Balance increases through 2034 as the additional funding and earnings exceed the required amount to pay claims. The fund balance begins to decline after that as the settlement fund continues to pay claims, but with earnings as its only source of revenue - there is no additional funding contributed after 2033. The last claim is paid in the early 2080s, at which time the fund is estimated to have a balance of approximately $80 million.[16]

Table 7-2
Settlement Fund Compensation Payments, Funding and Earnings
Through the Payment of the Last Compensable Claim
($ millions)

Time Period	Compensation Amount[1]	Funding	Earnings	End of Period Fund Balance
2014 through 2018	$292.3	$364.0	$25.0	$91.6
2019 through 2023	$78.2	$103.7	$28.1	$143.8
2024 through 2028	$95.5	$103.7	$38.6	$189.0
2029 through 2038	$178.6	$103.7	$103.2	$214.0
2039 through 2048	$167.7	$0.0	$72.9	$116.2
Remaining 35 Years	$133.3	$0.0	$103.4	$80.4
Total	$945.5	$675.0	$371.2	na

[1]Includes processing Costs

Note: Funding plus earnings is actually slightly in excess of the amount needed to pay all claims.

Inflation and Real Rate of Return

A key assumption in determining whether the settlement is adequately funded is the real rate of return earned on settlement assets. I have assumed a 2.5% real rate of return – a 4.5% nominal yield and an underlying 2.0% inflation rate. The actual expected return is dependent on the real returns available for different types of assets and the portfolio mix adopted by the settlement administrators.

[16] The $80 million balance in the early 2080s implies overfunding of only approximately $5 million at 2014 levels.

Historical experience suggests that a real rate of return of 2.5% is at the lower level of expected returns. Returns on debt and equity both exceed 2.5% real rate of return over long periods of time. Indeed, even an extremely high reliance on low risk financial assets historically has yielded more than 2.5% annually. However, because of historically low bond yields in recent years, I conservatively assumed a 2.5% return.

Studies of real rates of return reflect that over long periods of time through recent years, the real rate of return (after inflation) on long-term U.S. government bonds was approximately 3.4% annually; municipal bonds yielded approximately 3.9% real return annually and equities of different categories yielded 5-6% in real return annually. Thus, any mixed portfolio of equities and long-term government bonds would have yielded a 4% to 5% annual return in real terms.

The average annualized real return for a 50% equity/50% bond portfolio over the last 80+ years both for expansionary periods and for recessions exceeds 2.5%. Indeed, the average annual real return for recessions is 5.26%, while for expansions, it is 5.59%.

Finally, an examination of mutual funds (and among them, focusing on the ones with conservative asset allocation) shows that the overwhelming majority (98.3%) of funds returned at least 2.5% in real terms over the last five years.[17]

Timing of Claim Payments

There will be a time lag between the time a claim is filed and the date of disbursement of compensation. To allow for claims to be reviewed, processed (including the curing of any deficiencies) and paid, the analysis assumes that payments for all the claims filed within any given calendar year will be paid within 24 months (an average of 12 months) based on the following distribution of claim payments:

- 30% will be paid in the year the claim is filed
- 40% will be paid in the year after the claim was filed
- 30% will be paid in the second year after the claim was filed.

The analysis assumes that all of the claims that have already been filed and have diagnoses or the player is deceased will be paid - 70% in 2015 and 30% in 2016[18].

The model is based on a nominal rate of return on invested funds of 4.5%. Inflation over the life of the fund is assumed to be 2.0% per year and this rate is applied to future monetary award amounts as well as administration costs.

---

[17] References: David Blanchett, Michael Finke and Wade D. Pfau (2013), "Low Bond Yields and Safe Portfolio Withdrawal Rates," Morningstar Investment Management, January 21, 2013; Joseph Davis and Daniel Piquet (2011), "Recessions and balanced portfolio returns," Vanguard, October 2011, and; Thornburg Investment Management (2013), "A Study of *Real* Real Returns," July 2013.

[18] A 95% participation rate assumption is applied to claims already filed that do not have a current diagnosis.

Administration Costs

Based on information provided by the Claims Administrator and the CMS Lien Administrator, the following costs have been included in the cash flow modeling:

- Start-up costs – a total of $2 million in start-up costs for the Monetary Award Fund are assumed to occur in 2014.
- Claim review and processing costs – an average cost of $750 per claim including both valid claims and claims that will not be paid are assumed to be incurred at the time of diagnosis for valid claims. It is assumed that there will be an equal number of valid and invalid claims. Therefore the model applies a combined total cost of $1,500 to each valid claim.
- CMS lien processing – there will be a $100 processing charge to the MAF applied to each claim, which is applied to both valid and invalid claims. It is assumed that there will be an equal number of valid and invalid claims. Therefore, the model applies a combined total cost of $200 to each valid claim. All other costs for CMS lien handling are charged against individual monetary awards and does not affect the cash flow of the settlement fund.
- Payments to the Special Master of $100,000 per year for five years.

Player Participation Rates

The participation rate in the Settlement program among eligible former NFL players is a significant factor in determining the number of claims that will be filed and thus also the amount of funds required to resolve the claims.

In order to establish an estimate of the participation rate, several factors were considered. First, experience with participation rates in other mass tort cases was reviewed. In general, participation rates in mass torts are dependent on the outreach and notice program, the lag from exposure/injury to the manifestation of a compensable disease/injury and award size. For comparison, the participation rates for various large and widely publicized class action settlements and data on consumer product recall response rates were considered:

- Breast implant settlement achieved registrations from 30% of the eligible class members (440,000 of 1.5 million), based on an advertising-only class notification program.
- Consumer product recall response rates range from 4% to 18% according to the U.S. Consumer Product Safety Commission (CPSC).

In the case of former NFL players, approximately 4,200 claims were already registered at the time this analysis was prepared, which represents more than 20% of the potentially eligible population of approximately 20,200 former players.[19] I understand that former players have been

[19] Additional claims have been filed since this analysis was performed.

and continue to be contacted by plaintiff lawyers and others to participate. Whether continuing further efforts are likely to attract a significant number of additional players is not certain.

Nonetheless, it is assumed that the participation rates in this settlement will achieve high levels because the settlement has very high public visibility and contact information available through the NFL Players union and other sources that can be used in the notification process is available for a large portion of the potentially eligible population. My forecast of the number of future claims and the resulting cash requirements to fund the settlement assumes that: (1) 100% of deceased players with CTE will participate, (2) 20% of players deceased from 2000 through 2005 will participate, (3) 100% of players with a diagnosis that have already filed claims will participate, (4) 95% of players without a diagnosis that have already filed a claim will participate and (5) 50% of the living and deceased former NFL players that have not yet filed will ultimately participate. These assumptions yield an approximately 60% participation rate for all potentially eligible former players.

The Settlement Agreement provides a Baseline Assessment Program (BAP) for players who participate in the settlement. However, if a player (who is not yet diagnosed with a compensable disease) registers to participate in the Settlement Agreement but does not participate in the baseline assessment provided for under the BAP, a 10% discount is applied to any future monetary award for a compensable disease. This analysis assumed that all players who participate in the Settlement Agreement will also participate in the BAP and therefore no discounts were applied to future compensation awards.

My work on this matter is ongoing. I reserve the right to update or expand upon the opinions expressed in this report on the basis of that work, and in response to any analysis put forth by other experts.

Thomas Vasquez, Ph.D.

February 9, 2014

Appendix A: Determination of Incidence Rates

Background Incidence

This section describes ARPC's methodology and reference sources used to determine background incidence rates of diseases that might be associated with concussions and other repetitive head injuries, and therefore, potentially considered as a compensable disease. When incidence rates were available by gender, we captured the rates for men only. For some diseases, rates were not available by gender; in these cases the reported statistics are for both genders.

Extrapolating to younger ages

For some diseases, incidence (or prevalence) rates were available only for the population above a certain age (*e.g.*, 65). In these cases, we assumed that the rate for a 20-year-old would be equal to one-hundredth of the rate for a 65-year-old. For ages between 20 and 65, we assumed that the rate increases exponentially.

The literature indicates that diseases associated with advanced age (*e.g.*, Alzheimer's and dementia), rarely occur in young age, and reliable statistics for young ages are not available.

Exponential smoothing

Diseases for which there were estimates of incidence available for various age ranges instead of a particular age, a midpoint in the age range was chosen (in the case of ages 85+, typically age 90 was used), and the estimated incidence rate for that age group was assigned to that midpoint. Between data points, an exponential curve was fit based on the starting and ending rates, and the number of years in between them.

Stroke-Related Alzheimer's disease and Dementia

Alzheimer's disease and dementia can sometimes be attributed to prior history of stroke. According to epidemiological research, 8 to 10 percent of Alzheimer's and dementia patients had a history of stroke prior to the onset of Alzheimer's or dementia. Claimants who fall into this category will receive 25 percent of the compensation they would receive if they had not had a prior history of stroke. To reflect the reduction in the total compensation amount, the overall incidence numbers for Alzheimer's and dementia were reduced by a number equal to 75 percent of those who also had prior history of stroke (*i.e.*, only a quarter of those with a stroke history are included in the background incidence).

References

- Dodge, Chang, Kamboh, Ganguli (2011), "Risk of Alzheimer's Disease Incidence Attributable to Vascular Disease in the Population," Alzheimers Dement. 2011 May; 7(3): 356–360

Approach and Reference Sources for Specific Conditions

1. Alzheimer's Disease

Table 1 of Hebert, et al. (2001) provides the estimated annual number of incidence cases from 1995 through 2050 by age group. Figures for 2010 were used in the life cycle model. Estimates were available for the following three age categories: 65-74, 75-84, and 85+. To calculate an estimate for age categories between 20 and 65, an exponential extrapolation method was used, by also assuming that the rate for a 20-year-old was one hundredth of the rate for a 65-year-old. No gender-specific rates were available therefore the statistics are for both genders. However, many studies of the age-specific incidence (development of new cases) of Alzheimer's disease or any dementia have found no significant difference by gender.

As noted earlier, a final modification was made to the incidence rates based on the number of Alzheimer's disease patients who have had a stroke history to account for joint causality.

References

- Alzheimer's Association, "2013 Alzheimer's Disease Facts and Figures," 2013
- Hebert, Beckett, Scherr, and Evans, "Annual Incidence of Alzheimer's Disease in the United States Projected to the Years 2000 Through 2050," *Alzheimer's Disease and Associated Disorders* 2001; Vol. 15, No. 4, pp. 169–173

2. ALS

An overall incidence rate was reported from two sources, both citing the same figure: 2 per 100,000 persons per year. While ALS can be diagnosed at any age, typically it is diagnosed between age 40 and 70. Hence, it was assumed that the rate is constant 2/100,000 for ages between 40 and 70. For under age 40, the extrapolation to younger ages was performed, as

described above. For over age 70, the incidence rate was assumed to be 2/100,000. No gender-specific rates were available therefore the statistics are for both genders.

References

- ALS Association, "Epidemiology of ALS and Suspected Clusters," retrieved from http://www.alsa.org/als-care/resources/publications-videos/factsheets/epidemiology.html on July 1, 2013.
- The Robert Packard Center for ALS at Johns Hopkins, "ALS Facts and Statistics", retrieved from http://www.alscenter.org/living_with_als/facts_statistics.html on July 15, 2013.
- Statistics Brain, "Lou Gehrig's Disease ALS Statistics" retrieved from http://www.statisticbrain.com/lou-gehrigs-disease-als-statistics/ on June 25, 2013.
- Clark, Pritchard and Sunak, "The Epidemiology and Etiology of Amyotrophic Lateral Sclerosis: An Integrated and Inter-Disciplinary Perspective", *A Working Report to the Department of Public Health, State of Massachusetts* on behalf of the ALS Therapy Development Foundation, Massachusetts, page 2 of 106 retrieved from http://www.researchals.org/uploaded_files/mdph_alsreport_211aDS.pdf on June 25, 2013.

3. Parkinson's Disease

The incidence rates for Parkinson's disease were obtained from a study by Van Den Eeden et al. (2003), which examined newly diagnosed Parkinson's disease cases in 1994-1995 among members of the Kaiser Permanente Medical Care Program of Northern California. Table 2 of the study provides annual incidence rates by age and gender. The statistics we use are for men only.

References

- Van Den Eeden, Tanner, Bernstein, Fross, Leimpeter, Bloch, and Nelson, "Incidence of Parkinson's Disease: Variation by Age, Gender, and Race/Ethnicity," *Am. J. Epidemiol.* 2003; 157 (11): 1015–1022

4. Dementia

Incidence rates were available from multiple sources for dementia. In particular, the following sources were used:

- Corrada, et al. (2010); Table 2; Incidence rates for 4 specific age groups; US – men only
- Fitzpatrick, et al. (2004); Table 1; Incidence rates for 4 specific age groups; US – white men only
- Ganguli, et al. (2000); Table 1; Incidence rates for 6 specific age groups; US – men only; more severe dementia with CDR≥1.0
- Hendrie, et al. (2001); Table 5; Incidence rates for 3 specific age groups; African Americans in US – both sexes
- Knopman, et al. (2006); Table 1; Incidence rates for 9 specific age groups; US – men only
- Jorm and Jolley (1998); Table 2; Incidence rates for 5 specific age groups; US – both sexes; moderate+ dementia
- Riedel-Heller, et al. (2001); Table 1 and 2; Incidence rates for 4 specific age groups; Germany – men only

After careful examination of these data sources, the rates reported by Corrada, et al. (2010) and Knopman, et al. (2006) appeared to be outliers relative to the other sources. Therefore, these two studies were excluded and average age-specific incidence rates were calculated on the basis of the other five studies. As indicated above, all of these sources reported age-specific rates, but only for people older than 65. To estimate incidence rates for people younger than 65, Harvey et al. (2003) was used. This study reported age-specific prevalence rates for the population between 30 and 65. These prevalence rates were very small (each of them significantly smaller than the incidence rates for each of the age categories above 65). Since for a terminal (*i.e.*, incurable) disease such as dementia, prevalence is always an upper bound for incidence, we assumed that incidence rates for the population below 65 is equal to the prevalence rate.

A modification was made to these dementia incidence rates because of the relationship between Alzheimer's disease and dementia. Alzheimer's disease is the most common type of dementia, and eventually all Alzheimer's patients will develop dementia. However, not all dementia is due to Alzheimer's disease.[20] Thus, the calculated overall dementia incidence rates shown above in figure 2.1 include all cases of Alzheimer's disease. To correct for this, the Alzheimer's disease incidence rates were subtracted from the overall dementia incidence rates. Consistent with Friedenberg (2003), exclusion of Alzheimer's disease incidence approximately halved the calculated incidence of dementia – for example, at age 95, the 4.103% Alzheimer's incidence rate was subtracted from the overall dementia incidence rate of 9.57%, resulting in a non-Alzheimer's dementia incidence rate of 5.467%.

As noted above in the general remarks, a final modification was made to the incidence rates based on the number of dementia patients who have had a stroke history.

[20] One study, by Friedenberg (2003), found that patients with Alzheimer's disease comprised approximately 50% of all dementia cases, with Lewy dementia and frontotemporal dementia each comprising approximately 15% of total dementia cases, and vascular dementia comprising a further 10% of all dementia cases.

References

- Alzheimer's Association, "2013 Alzheimer's Disease Facts and Figures," 2013
- Corrada, Brookmeyer, Paganini-Hill, Berlau, and Kawas, "Dementia Incidence Continues to Increase with Age in the Oldest Old: The 90+ Study," *Ann Neurol.* 2010 January; 67(1): 114–121
- Fitzpatrick, Kuller, Ives, Lopez, Jagust, Breitner, Jones, Lyketsos, and Dulberg, "Incidence and Prevalence of Dementia in the Cardiovascular Health Study," *Journal of American Geriatric Society* 2004; 52: 195–204
- Friedenberg, "Dementia: One of the Greatest Fears of Aging," Radiology 2003; 229: 632–635
- Ganguli, Dodge, and Chen, "Ten-year Incidence of Dementia in a Rural Elderly US Community population: The MoVIES Project," *Neurology* 2000; 54: 1109–1116
- Harvey, Skelton-Robinson, and Rossor, "Prevalence and Causes of Dementia in People Under the Age of 65 Years," *J Neurol Neurosurg Psychiatry* 2003; 74: 1206–1209
- Hendrie, Ogunniyi, Hall, Baiyewu, Unverzagt, Gureje, Gao, Evans, Ogunseyinde, Adeyinka, Musick, and Hui, "Incidence of Dementia and Alzheimer Disease in 2 Communities," *JAMA* February 14, 2001; Vol. 285, No. 6 739–747
- Jorm and Jolley, "The incidence of dementia: A meta-analysis," Neurology 1998; 51: 728–733
- Knopman, Petersen, Cha, Edland, and Rocca, "Incidence and Causes of Nondegenerative Nonvascular Dementia," *Arch Neurol.* 2006; 63: 218–221
- Riedel-Heller, Busse, Aurich, Matschinger, and Angermeyer, "Incidence of Dementia According to DSM-III-R and ICD-10," *British Journal of Psychiatry* 2001; 179: 255–260

Induced Incidence/Risk Multiplier

This section describes the methodology and sources used for estimating the increased risk to professional football players (or comparables) relative to the general population of developing certain compensable diseases.

For Alzheimer's disease, Parkinson's, ALS and dementia, a risk multiple of 2.0 for ages 20 through 60 was used. After age 60, it was assumed that the relative risk is more additive in nature than multiplicative, and so the induced incidence is calculated as the background (general population) incidence at those ages, plus the induced incidence rates at age 60 for each of the diseases

For each of the particular diseases discussed below, there were multiple sources reporting a risk to professional football players as a multiple of the risk experienced by the general population. Unless otherwise specified, risk multiples are uniform across ages (e.g., the relative risk is the

same across ages for professional football players). For the majority of diseases, no peer-reviewed published research on the risk to professional football players relative to the general population was been identified.

It is clear that the literature and studies to date conclude a wide range of estimates of the relative risk associated with concussion or other forms of brain injury. The results vary from relative risk significantly under 1.0 to risks in excess of 3.0. Many if not all of the studies have issues that question their accuracy. These issues include items such as small sample sizes, types of populations, types of injuries and characteristics of the studied population.

Specific diseases, disorders, injuries, and symptoms

5. Alzheimer's Disease

There were two sources identified that report the relative risk of Alzheimer's for professional football players (Guskiewicz (2005) and Lehman (2012)) and three studies on the risk from mild traumatic brain injuries for developing Alzheimer's disease. The induced incidence rates reported in these studies range from 0.76 to 4.1. Lehman (2012) reported that the risk of Alzheimer's being a contributing factor to death, *i.e.,* not necessarily the underlying cause, was 3.86 times greater for former NFL players who had played 5 years or more than for the general population. Guskiewicz (2005) noted a differential in the risk as a function of age, with the risk declining from 4 among younger players to 1 for players over the age of 75.

Mortimer (1991), in a meta-analysis of 7 previous studies, found a relative risk of 2.67 for men. Nemetz (1999) found that the standardized incidence ratio was 1.4 for men who had experienced a traumatic brain injury, from a population cohort in Olmsted County, Minnesota. Mehta (1999), using a population cohort from Rotterdam, The Netherlands, found a relative risk for men of 0.9. Plassman (2000), in a population-based cohort study of U.S. World War II veterans, found a hazard ratio for those who suffered a mild head injury (defined as a "loss of consciousness or post-traumatic amnesia for less than 30 minutes, with no skull fracture") of 0.76. Schofield (1997), in a community longitudinal study in Manhattan, NY, found a relative risk of developing Alzheimer's of 4.1 for those who had a history of head injury.

References

- Guskiewicz, Kevin M., et al., "Association between Recurrent Concussion and Late-Life Cognitive Impairment in Retired Professional Football Players," *Neurosurgery*, Vol. 57, No. 4 (Oct. 2005): 719-726

- Lehman, Everett J., et al., "Neurodegenerative causes of death among retired National Football League players," *Neurology* Vol. 79 (Nov. 6, 2012): 1-5
- Mehta, K.M., et al., "Head trauma and risk of dementia and Alzheimer's disease," *Neurology*, Vol. 53 (1999): 1959-1962
- Mortimer, J.A., et al., "Head Trauma as a Risk Factor for Alzheimer's Disease: A Collaborative Re-Analysis of Case-Control Studies," *International Journal of Epidemiology*, Vol. 20, No. 2 (1991): S28-S35
- Nemetz, Peter N., et al., "Traumatic Brain Injury and Time to Onset of Alzheimer's Disease: A population-based study," *American Journal of Epidemiology* Vol. 149, No. 1 (1999): 32-40
- Plassman, B.L., et al., "Documented head injury in early adulthood and risk of Alzheimer's disease and other dementias," *Neurology*, Vol. 55 (2000): 1158-1166
- Schofield, P.W. et al., "Alzheimer's disease after remote head injury: an incidence study," *Journal of Neurology, Neurosurgery and Psychiatry,* Vol. 62 (1997): 119-124

6. ALS

There was no study that directly isolated the induced risk of ALS among former NFL players. The findings of three studies reported estimated induced incidence ranging from 1.13 to 4.31. These include the Lehman study (Lehman (2012)), which looked at ALS as a contributing factor (*i.e.*, not necessarily the specific cause of death) for a more exposed population of retired professional football players – those who had played 5 years or more. From the Schmidt (2010) study of veterans, we calculated a risk multiple of 1.13 for veteran suffering head injuries developing ALS relative to those without head injuries.[21] No age-breakdowns were available from Lehman (2012) or Schmidt (2010) (although Schmidt did provide a breakdown for the age at the time of the last injury, with those being injured after age 29 being at a 1.49 times risk). Chio (2005) looked at the effect of age on risk among a population of Italian soccer players, and found that for ages up to 49, the Standard Morbidity Ratio was 7.5, but then fell to 4.2 for those older than 50.

References

- Lehman, Everett J., et al., "Neurodegenerative causes of death among retired National Football League players," *Neurology* Vol. 79 (Nov. 6, 2012): 1-5
- Schmidt, Silke, et al., "Association of ALS with Head Injury, Cigarette Smoking and APOE Genotypes," *Journal of Neurological Science* Vol. 291 (April 2010): 22-29

[21] Schmidt (2010) reported Odds Ratios in its text. We have calculated from the underlying data reported in Schmidt (2010) a risk multiple for ease of comparison to the other studies.

- Chio, Adriano, et al., "Severely increased risk of amyotrophic lateral sclerosis among Italian professional football players," *Brain* Vol. 128 (2005): 472-476

7. Dementia

Five studies were considered with respect to the increased risk of dementia. These studies produced estimates of induced risk ranging from 0.7 to 3.86. Again, Lehman (2012) reported that the risk of Dementia as a contributing factor to a player's death (*i.e.*, not necessarily the specific cause of death) was 3.86. Mehta (1999), in a population-based cohort from The Netherlands, found the risk multiple for men developing dementia was 0.7. Plassman (2000) found that hazard rate for a cohort of U.S. Navy and Marine veterans of World War II was 1.33. Finally, Lee (2013), in a population-based study from Taiwan, found a hazard ratio of 3.26. Another source, Amen (2011) was excluded because of the small sample size (n=100), and inconsistency between prevalence and incidence in its calculations.

References

- Amen, Daniel G. et al., "Impact of Playing American Professional Football on Long-Term Brain Function," *Journal of Neuropsychiatry and Clinical Neuroscience*, Vol. 23, No. 1 (Winter 2011): 98-106
- Lee, Yi-Kung, et al., "Increased Risk of Dementia in Patients with Mild Traumatic Brain Injury: A Nationwide Cohort Study," *PLOS ONE*, Vol. 8, No. 5 (May 2013): 1-7,
- Lehman, Everett J. et al., "Neurodegenerative causes of death among retired National Football League players," *Neurology* Vol. 79 (Nov. 6, 2012): 1-5
- Mehta, K.M. et al., "Head trauma and risk of dementia and Alzheimer's disease," *Neurology*, Vol. 53 (1999): 1959-1962
- Plassman, B.L. et al., "Documented head injury in early adulthood and risk of Alzheimer's disease and other dementias," *Neurology*, Vol. 55 (2000): 1158-1166

8. Parkinson's Disease

Four sources were identified that calculated a risk multiple for Parkinson's Disease, one based on a study of retired NFL players, and three more generalized to the risk of Parkinson's after a traumatic brain/head injury. These studies reported risk multiples ranging from 1.44 to 1.69. The Lehman (2012) study found that the risk of a retired NFL player dying with Parkinson's as a contributing factor was 1.69 times greater than that of the male general population.

From the Bower (2003) study of U.S. males and females from Rochester, Minnesota we calculated a risk multiple of 1.76, while from Lee (2012), we calculated a 1.44 risk multiple for the central-California-based sample. From the Goldman (2006) study on male twin pairs, we calculated a risk multiple of 1.48.[22] Both Goldman (2006) and Bower (2003) are for males only, while the only data available from Lee (2012) was for both genders. Multiple additional studies on the impact of brain trauma are available (summarized in Goldman (2006)), but all were conducted in the 1980s and 1990s. No further breakdowns of the multiple by age were available in any of the studies.

References

- Bower, J.H. et al, "Head Trauma Preceding PD: A Case-Control Study," *Neurology* Vol. 60 (2003): 1610-1615
- Goldman, Samuel M. et al., "Head Injury and Parkinson's Disease Risk in Twins," *Annals of Neurology*, Vol. 60 (2006): 65-72
- Lee, Pei-Chen et al., "Traumatic Brain Injury, Paraquat Exposure, and Their Relationship to Parkinson Disease," *Neurology* Vol. 79 (2012): 2061-2066.
- Lehman, Everett J. et al., "Neurodegenerative causes of death among retired National Football League players," *Neurology* Vol. 79 (Nov. 6, 2012): 1-5

[22] Bower (2003), Lee (2012) and Goldman (2006) all reported only the Odds Ratios in their texts, so for comparison purposes, we have calculated the corresponding Risk Ratio for use in the average.

Appendix B: Annual Cash Flow Model and Assumptions

Cash Flow Modeling Assumptions

Item Category	Assumed Value	Notes
Funding and Investment	2.0%	
Inflation on Monetary Award Amounts	2.5%	
Real rate of return on invested funds	4.5%	
Nominal rate of return on invested funds		
Claim Review and Processing		
Facility start up costs	$2,000,000	
Cost per claim	$1,700	Expected cost for claim review and processing is $750/claim. There is an additional $100 fee per claim for processing medicare liens. Both fees are applied to claims that are filed, inlcuding those that are valid for payment and claims that will not be paid. The model counts the number of valid claims. It is assumed that there will be an equal number of payable and non-payable claims so a total cost of $1,700 per valid claim is used in the model (2 x $750) + (2 x $100)
Inflation on processing costs	2.0%	

Dollars by Year Paid - Accounting for Payment Lag and Participation Rate
($ millions)

	Filers		Futures		Deceased >2005		Death w/ CTE		Deceased<=2005		Processing Cost		Total	
Year	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV
Total	$426.9	$251.2	$415.7	$179.1	$19.3	$17.8	$65.7	$60.7	$5.7	$5.3	$10.1	$3.2	$945.5	$519.4
2013														
2014													$2.0	$2.0
2015	$98.0	$91.8	$12.5	$11.7	$13.5	$12.6	$46.0	$43.1	$4.0	$3.8	$0.2	$0.2	$174.2	$163.0
2016	$46.8	$41.9	$10.3	$9.3	$5.8	$5.2	$19.7	$17.7	$1.7	$1.5	$0.2	$0.2	$84.5	$75.7
2017	$8.0	$6.9	$7.9	$6.7		$0.0		$0.0		$0.0	$0.2	$0.1	$16.0	$13.7
2018	$6.8	$5.5	$8.6	$7.0		$0.0		$0.0		$0.0	$0.2	$0.2	$15.5	$12.7
2019	$6.4	$5.0	$9.1	$7.2		$0.0		$0.0		$0.0	$0.2	$0.1	$15.7	$12.3
2020	$6.2	$4.7	$9.2	$6.9		$0.0		$0.0		$0.0	$0.1	$0.1	$15.5	$11.6
2021	$5.6	$4.0	$8.5	$6.1		$0.0		$0.0		$0.0	$0.1	$0.1	$14.1	$10.2
2022	$5.8	$4.0	$9.7	$6.7		$0.0		$0.0		$0.0	$0.1	$0.1	$15.6	$10.7
2023	$7.1	$4.7	$10.1	$6.6		$0.0		$0.0		$0.0	$0.1	$0.1	$17.3	$11.4
2024	$8.2	$5.2	$10.2	$6.4		$0.0		$0.0		$0.0	$0.1	$0.1	$18.6	$11.7
2025	$8.3	$5.0	$11.5	$6.9		$0.0		$0.0		$0.0	$0.1	$0.1	$19.9	$12.0
2026	$7.3	$4.2	$12.4	$7.2		$0.0		$0.0		$0.0	$0.1	$0.1	$19.8	$11.4
2027	$7.4	$4.1	$11.8	$6.5		$0.0		$0.0		$0.0	$0.1	$0.1	$19.3	$10.7
2028	$6.9	$3.6	$10.8	$5.7		$0.0		$0.0		$0.0	$0.1	$0.1	$17.8	$9.4
2029	$7.5	$3.8	$10.0	$5.0		$0.0		$0.0		$0.0	$0.1	$0.1	$17.6	$8.9
2030	$9.1	$4.4	$8.5	$4.1		$0.0		$0.0		$0.0	$0.1	$0.1	$17.7	$8.6
2031	$8.8	$4.1	$8.1	$3.7		$0.0		$0.0		$0.0	$0.1	$0.1	$17.0	$7.9
2032	$7.4	$3.3	$9.1	$4.0		$0.0		$0.0		$0.0	$0.1	$0.1	$16.7	$7.4
2033	$6.6	$2.8	$9.7	$4.1		$0.0		$0.0		$0.0	$0.2	$0.1	$16.4	$7.0
2034	$7.4	$3.0	$9.3	$3.8		$0.0		$0.0		$0.0	$0.2	$0.1	$16.8	$6.8
2035	$8.0	$3.1	$9.6	$3.7		$0.0		$0.0		$0.0	$0.2	$0.1	$17.8	$6.9
2036	$9.0	$3.3	$10.3	$3.8		$0.0		$0.0		$0.0	$0.2	$0.1	$19.5	$7.2
2037	$9.2	$3.3	$10.4	$3.7		$0.0		$0.0		$0.0	$0.2	$0.1	$19.8	$7.0
2038	$8.8	$3.0	$10.3	$3.5		$0.0		$0.0		$0.0	$0.2	$0.1	$19.3	$6.6
2039	$7.6	$2.5	$10.0	$3.3		$0.0		$0.0		$0.0	$0.2	$0.1	$17.8	$5.8
2040	$6.9	$2.2	$11.5	$3.6		$0.0		$0.0		$0.0	$0.2	$0.1	$18.7	$5.8
2041	$6.8	$2.0	$11.5	$3.4		$0.0		$0.0		$0.0	$0.2	$0.1	$18.6	$5.5
2042	$6.7	$1.9	$10.6	$3.0		$0.0		$0.0		$0.0	$0.2	$0.1	$17.6	$5.0
2043	$7.8	$2.1	$8.2	$2.2		$0.0		$0.0		$0.0	$0.2	$0.1	$16.1	$4.4
2044	$8.1	$2.1	$7.7	$2.0		$0.0		$0.0		$0.0	$0.2	$0.1	$16.0	$4.2
2045	$8.8	$2.2	$6.5	$1.6		$0.0		$0.0		$0.0	$0.2	$0.1	$15.5	$3.9
2046	$7.9	$1.9	$8.4	$2.0		$0.0		$0.0		$0.0	$0.3	$0.1	$16.5	$4.0
2047	$6.4	$1.5	$9.5	$2.2		$0.0		$0.0		$0.0	$0.2	$0.0	$16.1	$3.7
2048	$4.5	$1.0	$10.2	$2.2		$0.0		$0.0		$0.0	$0.2	$0.1	$14.9	$3.3
2049	$3.9	$0.8	$8.2	$1.7		$0.0		$0.0		$0.0	$0.2	$0.0	$12.3	$2.6
2050	$3.8	$0.8	$7.9	$1.6		$0.0		$0.0		$0.0	$0.2	$0.0	$11.8	$2.4
2051	$4.2	$0.8	$6.6	$1.3		$0.0		$0.0		$0.0	$0.2	$0.0	$11.0	$2.1
2052	$4.6	$0.8	$5.7	$1.1		$0.0		$0.0		$0.0	$0.3	$0.0	$10.6	$1.9
2053	$4.6	$0.8	$5.5	$1.0		$0.0		$0.0		$0.0	$0.3	$0.0	$10.3	$1.8
2054	$3.7	$0.6	$5.2	$0.9		$0.0		$0.0		$0.0	$0.2	$0.0	$9.2	$1.5
2055	$2.8	$0.5	$5.2	$0.8		$0.0		$0.0		$0.0	$0.2	$0.0	$8.2	$1.3
2056	$2.5	$0.4	$4.5	$0.7		$0.0		$0.0		$0.0	$0.2	$0.0	$7.3	$1.1
2057	$2.2	$0.3	$4.2	$0.6		$0.0		$0.0		$0.0	$0.2	$0.0	$6.7	$1.0
2058	$1.9	$0.3	$4.1	$0.6		$0.0		$0.0		$0.0	$0.2	$0.0	$6.1	$0.9
2059	$1.6	$0.2	$3.9	$0.5		$0.0		$0.0		$0.0	$0.2	$0.0	$5.6	$0.8
2060	$1.3	$0.2	$3.3	$0.4		$0.0		$0.0		$0.0	$0.2	$0.0	$4.8	$0.6
2061	$1.4	$0.2	$2.6	$0.3		$0.0		$0.0		$0.0	$0.2	$0.0	$4.2	$0.5
2062	$1.2	$0.1	$2.2	$0.3		$0.0		$0.0		$0.0	$0.2	$0.0	$3.6	$0.4
2063	$0.9	$0.1	$1.9	$0.2		$0.0		$0.0		$0.0	$0.1	$0.0	$3.0	$0.3
2064	$0.7	$0.1	$1.8	$0.2		$0.0		$0.0		$0.0	$0.2	$0.0	$2.6	$0.3
2065	$0.6	$0.1	$1.7	$0.2		$0.0		$0.0		$0.0	$0.1	$0.0	$2.4	$0.2
2066	$0.6	$0.1	$1.5	$0.2		$0.0		$0.0		$0.0	$0.2	$0.0	$2.3	$0.2
2067	$0.6	$0.1	$1.3	$0.1		$0.0		$0.0		$0.0	$0.1	$0.0	$1.9	$0.2
2068	$0.6	$0.1	$1.1	$0.1		$0.0		$0.0		$0.0	$0.2	$0.0	$1.8	$0.2
2069	$0.4	$0.0	$0.9	$0.1		$0.0		$0.0		$0.0	$0.1	$0.0	$1.3	$0.1
2070	$0.2	$0.0	$0.8	$0.1		$0.0		$0.0		$0.0	$0.1	$0.0	$1.1	$0.1
2071	$0.1	$0.0	$0.8	$0.1		$0.0		$0.0		$0.0	$0.1	$0.0	$1.0	$0.1
2072	$0.1	$0.0	$0.8	$0.1		$0.0		$0.0		$0.0	$0.1	$0.0	$0.9	$0.1
2073	$0.1	$0.0	$0.6	$0.0		$0.0		$0.0		$0.0	$0.1	$0.0	$0.8	$0.1
2074	$0.1	$0.0	$0.4	$0.0		$0.0		$0.0		$0.0	$0.1	$0.0	$0.6	$0.0
2075	$0.1	$0.0	$0.3	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.4	$0.0
2076	$0.0	$0.0	$0.2	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.3	$0.0
2077	$0.1	$0.0	$0.2	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.3	$0.0
2078	$0.1	$0.0	$0.2	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.3	$0.0
2079	$0.0	$0.0	$0.1	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.2	$0.0
2080	$0.0	$0.0	$0.1	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.1	$0.0
2081	$0.0	$0.0	$0.1	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.1	$0.0
2082	$0.0	$0.0	$0.0	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.0	$0.0
2083	$0.0	$0.0	$0.0	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.0	$0.0
2084	$0.0	$0.0	$0.0	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.0	$0.0
2085	$0.0	$0.0	$0.0	$0.0		$0.0		$0.0		$0.0	$0.0	$0.0	$0.0	$0.0

Appendix C: Summary of Claims Filed by Former NFL Players

Table C-1: Summary of Claims Filed by Former NFL Players[1]

	Disease/Impairment					
Category	**Death w/CTE**	**Alzheimers**	**ALS**	**Parkinsons**	**Dementia**	**Total**
Self-Reported (SR)	5	11	1	1	60	78
Diagnosed (D)	11	35	10	4	101	161
None	-	-	-	-	-	4,025
Total	**16**	**46**	**11**	**5**	**161**	**4264**

[1] Includes only those claims that were provided at the time of the analysis. Additional claims have been filed subsequently.

Notes: Self-Reported (SR) cases are those for which the filer identified diseases or impairments in their claim but did not have a medical diagnosis. Diagnosed (D) cases are those files that had a medical diagnosis for the diseases or impairments claimed. Some player's claims have more than one disease/impairment, and therefore could be counted in more than one disease category and therefore the total counts are greater than the number of claimants. Cases listed as Death with CTE represents those cases that were included on the list of CTE cases provided by Plaintiff representatives and were also included in the claims filed. In the model, only the cases of Alzheimer's, ALS, Parkinson's, and Dementia that had a medical diagnosis were used.

Appendix D: Examples of Life Cycle Modeling of Former NFL Players

The following pages present 14 different hypothetical cases to demonstrate how the life cycle model is applied. These hypothetical cases are:

1. Player diagnosed with Alzheimer's at age 52 who played 3 years.
2. Player diagnosed with Alzheimer's at age 63 who played 5 years.
3. Player who died of natural causes at the age of 77 who played 5 years.
4. Player diagnosed with ALS at age 44 who played 12 years.
5. Player diagnosed with Level 1.5 at 49 and Level 2 at 52 who played 4 years.
6. Player diagnosed with Level 1.5 at 55, progressing to Level 2 at 58, and progressing to Alzheimer's at 71 who played 9 years.
7. Player diagnosed with ALS at age 76 who played 6 years.
8. Player diagnosed with Alzheimer's at age 59 who played 2 years.
9. Player diagnosed with Level 1.5 at age 62, progressing to Level 2 at age 65 who played 5+ years.
10. Player diagnosed with Level 1.5 at age 72, progressing to Level 2 at 75 who played 6 years.
11. Player diagnosed with ALS at age 65 who played 3 years.
12. Player diagnosed with Alzheimer's at age 55 who played 2 years.
13. Player diagnosed with Parkinson's at age 50 who played 5+ years.
14. Player diagnosed with Parkinson's at age 68 who played 4 years.

Hypothetical Player Case Profile #1

Disease Diagnosed	Alzheimer's
Age at Diagnosis	52
Years played	3
Year of Compensation	2022
Total Nominal Compensation	$1,147,289

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%					X		Y	$ 1,147,289	Player diagnosed with Alzheimer's
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							Deceased		Player Deceased

Hypothetical Player Case Profile #2

Disease Diagnosed	Alzheimer's
Age at Diagnosis	63
Years played	5
Year of Compensation	2033
Total Nominal Compensation	$1,313,577

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%					X		Y	$1,313,577	Alzheimer's Diagnosed
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%	X						Deceased		Player Deceased

Hypothetical Player Case Profile #3

Disease Diagnosed	Natural Death
Age at Diagnosis	77
Years played	5
Year of Compensation	2053
Total Nominal Compensation	$0

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							N		
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%							N		
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%							N		
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%							N		
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%							N		
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%							N		
2046	76	4.7150%	0.0126%	0.7238%	0.0028%	1.2215%	0.0084%							N		
2047	77	5.1840%	0.0132%	0.8347%	0.0028%	1.3765%	0.0086%							N		
2048	78	5.7110%	0.0110%	0.9652%	0.0028%	1.5332%	0.0089%							N		
2049	79	6.3050%	0.0131%	1.1187%	0.0028%	1.6889%	0.0091%							N		
2050	80	6.9780%	0.0139%	1.2993%	0.0028%	1.8569%	0.0094%							N		
2051	81	7.7380%	0.0155%	1.4467%	0.0028%	2.0369%	0.0096%							N		
2052	82	8.5960%	0.0152%	1.6123%	0.0028%	2.2602%	0.0099%							N		
2053	83	9.5570%	0.0137%	1.7980%	0.0028%	2.5351%	0.0101%	X						Deceased	0	Player Deceased - Natural Causes

Hypothetical Player Case Profile #4

Disease Diagnosed	ALS
Age at Diagnosis	44
Years played	12
Year of Compensation	2014
Total Nominal Compensation	$5,100,000

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%		X					Y	$ 5,100,000	Player diagnosed with ALS
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%	X						Deceased		Player Deceased

Hypothetical Player Case Profile #5

Disease Diagnosed	Level 1.5 & 2
Age at Diagnosis	49, 52
Years played	4
Year of Compensation	2019, 2022
Total Nominal Compensation	$1,147,289

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%						X	Y	$ 729,753	Player Diagnosed with Level 1.5
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%						X	Y	$ 417,536	Player Diagnosed with Level 2
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							N		
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%							N		
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%							N		
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%							N		
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%							N		
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%							Deceased		Player Deceased

Hypothetical Player Case Profile #6

Disease Diagnosed	Level 2 & Alzheimer's
Age at Diagnosis	55, 58, 71
Years played	9
Year of Compensation	2025, 2028, 2041
Total Nominal Compensation	$1,178,981

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%						X	Y	$665,827	Player diagnosed with Level 1.5
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%						X	Y	$513,154	Player diagnosed with Level 2.0
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							N		
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%						X	Y	$0	Player diagnosed with Alzheimer's
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%							N		
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%							N		
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%							N		
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%							N		
2046	76	4.7150%	0.0126%	0.7238%	0.0028%	1.2215%	0.0084%							Deceased		Player deceased

Hypothetical Player Case Profile #7

Disease Diagnosed	ALS
Age at Diagnosis	76
Years played	6
Year of Compensation	2046
Total Nominal Compensation	$2,210,566

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							N		
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%							N		
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%							N		
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%							N		
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%							N		
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%							N		
2046	76	4.7150%	0.0126%	0.7238%	0.0028%	1.2215%	0.0084%		X					Y	$2,210,566	Player diagnosed with ALS
2047	77	5.1840%	0.0132%	0.8347%	0.0028%	1.3765%	0.0086%							N		
2048	78	5.7110%	0.0110%	0.9652%	0.0028%	1.5332%	0.0089%							N		
2049	79	6.3050%	0.0131%	1.1187%	0.0028%	1.6889%	0.0091%							N		
2050	80	6.9780%	0.0139%	1.2993%	0.0028%	1.8569%	0.0094%							N		
2051	81	7.7380%	0.0155%	1.4467%	0.0028%	2.0369%	0.0096%							N		
2052	82	8.5960%	0.0152%	1.6123%	0.0028%	2.2602%	0.0099%							Deceased		Player deceased

Hypothetical Player Case Profile #8

Disease Diagnosed	Alzheimer's
Age at Diagnosis	59
Years played	2
Year of Compensation	2029
Total Nominal Compensation	$587,552

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%					X		Y	$587,552	Player diagnosed with Alzheimer's
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							Deceased		Player deceased

Hypothetical Player Case Profile #9

Disease Diagnosed	Level 1.5 & 2
Age at Diagnosis	62, 65
Years played	5+
Year of Compensation	2032, 2035
Total Nominal Compensation	$710,996

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%						X	Y	$422,475	Player diagnosed with Level 1.5
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%						X	Y	$288,521	Player diagnosed with Level 2
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							N		
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%							N		
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%							N		
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%							N		
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%							N		
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%	X						Deceased		Player deceased from natural cause

Hypothetical Player Case Profile #10

Disease Diagnosed	Level 1.5 & 2
Age at Diagnosis	72, 75
Years played	6
Year of Compensation	2042, 2045
Total Nominal Compensation	$248,759

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							N		
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%							N		
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%						X	Y	$186,464	Player diagnosed with Level 1.5
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%							N		
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%							N		
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%						X	Y	$62,296	Player diagnosed with Level 2
2046	76	4.7150%	0.0126%	0.7238%	0.0028%	1.2215%	0.0084%							N		
2047	77	5.1840%	0.0132%	0.8347%	0.0028%	1.3765%	0.0086%							N		
2048	78	5.7110%	0.0110%	0.9652%	0.0028%	1.5332%	0.0089%	X						Deceased		Player deceased from natural cause

Hypothetical Player Case Profile #11

Disease Diagnosed	ALS
Age at Diagnosis	65
Years played	3
Year of Compensation	2035
Total Nominal Compensation	$2,504,487

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%		X					Y	$2,504,487	Player diagnosed with ALS
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							Deceased		Player deceased

Hypothetical Player Case Profile #12

Disease Diagnosed	Alzheimer's
Age at Diagnosis	55
Years played	2
Year of Compensation	2025
Total Nominal Compensation	$674,705

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%					X		Y	$674,705	Player diagnosed with Alzheimer's
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%	X						Deceased		Player deceased from natural cause

Hypothetical Player Case Profile #13

Disease Diagnosed	Parkinson's
Age at Diagnosis	50
Years played	5+
Year of Compensation	2020
Total Nominal Compensation	$2,444,288

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%				X			Y	$2,444,288	Player diagnosed with Parkinson's
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%	X						Deceased		Player deceased from natural causes

Hypothetical Player Case Profile #14

Disease Diagnosed	Parkinson's
Age at Diagnosis	68
Years played	4
Year of Compensation	2038
Total Nominal Compensation	$922,546

Life Cycle Modeling For Individual Former NFL Player

		Incidence						Outcome								
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suidice	Parkinson's	Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Nominal Compensation	Comments
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N		
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N		
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N		
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%				X			Y	$922,546	Player diagnosed with Parkinson's
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							N		
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%							N		
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%							N		
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%	X						Deceased		Player deceased from natural causes

Appendix E: List of Deceased Former NFL Players with CTE

List of Deceased Former NFL Players, Death with CTE (2000 - 2013)

Player Case No.	Year of Death	Seasons	Age at Death	Co-morbidity	Filed Plaintiff
1	2002	17	50		No
2	2004	9	36		No
3	2005	8	45		No
4	2006	12	44		Yes
5	2008	10	45		Yes
6	2008	16	66	ALS (cause of death)	Yes
7	2008	9	45		Yes
8	2009	10	82		No
9	2009	11	38		Yes
10	2009	5	26		No
11	2009	2	64		Yes
12	2009	1	75	AD	Yes
13	2009	1	49	ALS	Yes
14	2010		86		No
15	2010	10	78		Yes
16*	2010	3	36		No
17	2010	15	71		No
18	2010	7	98		No
19	2010	7	56		Yes
20	2010	1	47		No
21	2010	1	23		No
22*	2010	1	87		No
23	2011	5	73		No
24	2011	11	65		Yes
25	2011	6	69		Yes
26	2011	11	50		Yes
27	2011	8	67	ALS (2000)	Yes
28	2011	6	75		No
29	2011	13	81		No
30	2011	6	77		Yes
31	2011	2	56		Yes
32*	2011		74		No
33	2011	10	69	Dementia	Yes
34	2011	15	80	Dementia	Yes
35	2011	16	84	Dementia	No
36	2012	0.5	52	ALS (2002)	No
37*	2012				No
38	2012	8	62		Yes
39	2012	8	52		No
40	2012	2	56		Yes
41	2012	1	25		No
42	2012	21	43		Yes
43	2012	8	69	Dementia	Yes
44	2012	9	78		No
45	2012	8	61	Dementia	Yes
46	2013	1	30		No
47	2013	6	70		No
48	2013	9	75		Yes
49	2012	10	68		Yes
50	2008	7	52		No

*Player data could not be matched to player database and no secondary confirmation of NFL affiliation could be found and therefore was not included in the analysis.

Appendix F: CV of Thomas Vasquez Ph.D.

Dr. Vasquez is a vice president at Analysis, Research, Planning Corporation (ARPC) in the New York office. Dr. Vasquez has over 35 years of experience in management consulting for private sector clients, the development of economic models for US and foreign governments to analyze and develop tax, expenditure and regulatory policy and providing expert testimony over a wide range of issues.

Dr. Vasquez has provided management consulting services for private sector companies in a wide array of industry sectors. The services include identifying methods to: (1) increase the stock price or value of the company; (2) leverage the firm's brand asset; (3) assist underperforming companies and (4) provide general valuation services.

Dr. Vasquez has assisted US and foreign governments in the development of tax, expenditure and regulatory policy. The services include the development of large scale micro-economic models to allow policymakers to determine individual and company behavioral reactions to tax and regulatory policy.

Dr. Vasquez has provided expert testimony, depositions and analytical litigation support on a broad spectrum of issues involving statistical techniques, computer simulation, economic behavior and economic models, including, among others:

- Using statistical models to forecast a company's future liability from lawsuits related to its former production of asbestos including the following representative assignments – National Gypsum Corporation, the Fibreboard Corporation, Owens Corning, Congoleum, Western MacArthur, Burns and Roe, Inc. and Specialty Products Holding Corp.,
- Using statistical models to forecast a company's future liability from lawsuits related to its former sales of insurance products.
- The statistical analysis of the determinants of supply and demand in certain industry segments for use in business valuations before the Bankruptcy Court.
- The impact of regulation and tax policy on prices, sales and production.
- Analyzing the allocation of liability from a state's superfund tax.
- The statistical analysis of reasonable officer compensation levels in closely held companies.

Prior to joining ARPC, Dr. Vasquez was president and CEO of Yankelovich Partners, Inc., a leading market research firm. While at Yankelovich Partners, Dr. Vasquez had responsibility for engagements designed to determine the best approach to maximize the value of the client's firm. These engagements involved understanding the source of the value components of the firm – value of the firm's brand, product/service lines responsible for increasing (decreasing) stock price, the role of joint products and other key components of the firm's value.

From 1993 to 1997, Dr. Vasquez was the National Partner in Charge of Corporate Transactions Services for KPMG Peat Marwick. In this role he practiced in and led four of KPMG's national practices. One practice area was in the area of litigation support. This area involved almost exclusively the use of highly trained professionals in providing expert testimony in a wide range

of litigation issues. The second practice area involved providing consulting services in the bankruptcy and troubled company area. This area involved analyzing the condition and prospects of a company in financial distress, generally involving recommendations for expense control, revenue growth, elimination/sale of product and distribution lines and the elimination/selling of production sites. The third area is investment banking. This area focused on three major components: (1) buying and/or selling of companies for middle market clients; (2) advise to non-public clients preparing an Initial Public Offering, and (3) advise to clients on methods to increase share price and/or cash flow in anticipation of sale. The fourth area was business valuation. This area focused on the valuation of businesses in a wide range of settings including bankruptcy, fairness opinions, mergers and acquisitions, estate planning and other venues requiring valuation services.

Dr. Vasquez served on the Firm's Board of Directors from 1993 to 1997 and served as the Chairman of the Board's Strategic Planning Committee.

Prior to selling his firm to KPMG, Dr. Vasquez was the founder and President of the Policy Economics Group. Dr. Vasquez was responsible for all data base development and tax simulation modeling for federal and state government clients in the United States as well as foreign governments including among others Egypt, Pakistan, Hungary, the former Soviet Union, Trinidad-Tobago, Virgin Islands, Guam, El Salvador and Guatemala. Dr. Vasquez also developed similar models using specialized industry data bases to determine tax impacts and behavioral responses for commercial firms, industry associations and law firms. These models were also used to formulate the client's strategic direction, market initiatives and value maximization strategies.

Prior to establishing the Policy Economics Group, Dr. Vasquez was the Deputy Director for the U.S. Department of the Treasury Office of Tax Analysis. While there, he guided U.S. tax policy analysis and designed large micro-simulation models and data bases for the U.S. Treasury Department and the Joint Tax Committee of the U.S. Congress. He appeared before Congress to provide testimony on such issues as capital gains taxation. He also designed numerous specialized models and data bases for analyzing policy issues at the company, industry, and individual levels.

Professional Experience:

President and CEO, Yankelovich Partners Inc., 1997 to 1999
National Partner in Charge, Corporate Transactions Services, KPMG Peat Marwick, 1993 to 1997.
Managing Partner, Policy Economics Group, KPMG Peat Marwick, 1987 to 1993.
Founder and President, Policy Economics Group, 1983 to 1987.
Deputy Director, Office of Tax Analysis, U.S. Department of the Treasury, 1979 to 1983.
Assistant Director, 1978 to 1979; Fiscal Economist, 1972 to 1976.
Chief Economist, New York State Economic Development Board, 1977 to 1978.
Staff Economist, Congressional Joint Committee on Taxation, 1976.
Staff Economist, American Enterprise Institute for Public Policy Research, 1972.

Education:

Ph.D., Economics, Clark University, 1973.
M.A., Economics, Clark University, 1972.
B.S., Mathematics, State University of New York - Potsdam, 1970.

Legal Experience and Testimony:
National Gypsum Company Bankruptcy Proceedings, 1991
Deposition
Testimony
Gerald Ahern, et. al. vs. Fiberboard Corporation, et. al., 1994
Deposition
Testimony
Ezell Thomas, et. al. vs. R.J. Reynolds Tobacco Company, et. al., 1999
Deposition
Fiberboard Corporation and Owens Corning vs. R.J.Reynolds Tobacco Company, et. al., 1999
Deposition
Western Mac Arthur Company and Mac Arthur Company vs. General Accident Insurance Co. of America; United States Fidelity & Guaranty Co.; Argonaut Insurance Company, 1999
Affidavit
CSX Transportation, Inc. and American Home Ins. Co., 2000
Deposition
ADR Proceeding Celotex vs. Travelers Casualty and Surety Co. and London Market Insurers, 2000
Deposition, 2004
Testimony, 2004
Owens Corning Bankruptcy Proceedings, 2001
Deposition, 2004
Trial Testimony, 2005
Michael Albanese vs. Compaq Computer Corporation, 2002
Affidavit
ADR Proceeding ACandS, Inc. vs. Travelers Casualty and Surety Co., 2003
ASARCO vs
Deposition, 2003
Western Mac Arthur Company and Mac Arthur Company Bankruptcy Proceedings, 2003
Oglebay Norton Bankruptcy Proceedings, 2004
Deposition, 2004
Trial Testimony, 2004
Halliburton Bankruptcy Proceedings, 2004
Congoleum vs Ace Ins. Et al, 2005
Deposition, 2005
Trial Testimony, 2006
Gene B. Griego, et al., Plaintiffs, vs. Bechtel National, Inc. et al., Defendants
Deposition, 2005
Sandra Sue Fullen, et al, Plaintiffs v. Philips Electronics North America Corporation, a Delaware corporation, et al., Defendants
Deposition, 2005

St. Paul Fire and Marine Insurance Company, Plaintiff, vs. A.P.I., Inc., Defendant and Counter-Claimant
Deposition, 2005
Dana Corporation Bankruptcy Proceedings, Case No. 06-10354(BLR), 2007
Deposition, 2007
Trial Testimony, 2007
API, INC. Asbestos Settlement Trust v. Atlantic Mutual Insurance Company; Civil No. 09-0665 (JRT/JJG); United States District Court, D. Minnesota; July 9, 2010.
Deposition, 2010
Applebee's International, Inc., DineEquity, Inc. and Weight Watchers International, Inc. Sheree Shepard and Anthony Watts, On Behalf of Themselves and All Others Similarly Situated vs. DineEquity, Inc. et al.; United States District Court; District of Kansas; No. 08-cv-2416.
Deposition, 2010
API, Inc. Asbestos Settlement trust, et al. v. Zurich American Insurance Company, et al. Court File No. 09-CV-975 (JRT/JJG)
Deposition, March 29, 2011
Tronox Incorporated, Tronox Worldwide, LLC f/k/a; Kerr-McGee Chemical Worldwide LLC, and Tronox, LLC, f/k/a Kerr-McGee Chemical LLC vs. Anadarko Petroleum Corporation and Kerr-McGee Corporation
Deposition 2012
Specialty Products Holding Corp., et al Bankruptcy proceedings, Case No. 10-11780(JFK), 2012
Deposition, 2012
Trial Testimony, 2013